3 - GENERAL DESIGN CRITERIA

This section contains general guidelines for the design of subdivisions and related improvements. This section is intended as a guide only. The requirements, definitions and provisions of the following documents control subdivision design and are incorporated herein by reference: Chula Vista Municipal Code; Chula Vista Street Design Standards Policy; and Chula Vista Design and Construction Standards.

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GENERAL DESIGN CRITERIA
SECTION 3-100
LOT DESIGN

3-100 LOT DESIGN

3-101 General

Subdivision lots shall be designed to present an orderly and uniform appearance pursuant to the requirements in Title 19 of the Chula Vista Municipal Code (Zoning Ordinance) and approved SPA plan for the site. All requirements, definitions, and provisions of the Zoning Ordinance are hereby incorporated by reference.

3-102 **Size**

3-102.1 Each lot shall constitute a practical building site appropriate for the type of development contemplated, and shall include adequate pad areas. The pad area is adequate if it accommodates the proposed structures with adequate level areas as determined by the Zoning Ordinance.

3-102.2 The minimum lot area, lot widths, depths, and building setbacks are established by the Zoning Ordinance. Although a lot may have the required "lot area", it may not have adequate "pad area" due to slopes on the lot. Therefore, the "pad area" actually dictates the size of the lot. Custom lots are not usually affected by "pad area" because the house will be designed to fit the site.

3-102.3 The minimum depth for all residential lots shall be as established by the Zoning Ordinance (Title 19 of the Municipal Code) or by Planned Community District Regulations in a PC Zone District.

3-103 **Frontage**

3-103.1 Minimum lot frontages are established by the Zoning Ordinance and the Planned Community District Regulations. The Zoning Ordinance and Planned Community District Regulations will prevail over conflicting provisions contained in this manual.

3-103.2 Each lot created shall have direct access to public right of way unless waived by Planning Commission or meet flag lot provisions (See Section 19.22.150 of the Municipal Code). If this requirement is waived each lot shall have adequate access to public right of way via access easements or private streets.

3-103.3 The minimum lot frontage of a lot on a cul-de-sac or knuckle is 35 feet (11m) to allow adequate distance between driveways for on street parking or as prescribed in the Planned Community District Regulations.

3-103.4 Lots fronting on two (2) paralleling local streets are not permitted. Dual frontage lots may be permitted in "hillside development" areas but will have rights of access to only one street subject to approval of the City Engineer and Director of Planning.

3-103.5 Lots shall not front on prime arterials, major streets, Class I collectors, railroads, transmission lines and drainage channels unless otherwise approved by the Planning Commission or City Council. Lots may have rear lot lines that abut these areas or front lot lines on a frontage road.

3-103.6 If double frontage lots are approved and border a major or collector street, access to such streets shall be relinquished and a decorative masonry wall plus a ten foot minimum width landscape area with an automatic sprinkler system shall be provided for the full width of the lot.

3-103.7 Whenever lots are permitted to front on arterial, major or Class I collector streets by the Planning Commission or City Council, a "T" type driveway shall be provided on each lot in order that a car not back out onto the street because of the high potential traffic hazard.

3-104 Lot Lines

3-104.1 Side lot lines should be 90° perpendicular to a straight street and radial to a curved street and cul-de-sac to present a more orderly appearance. Side lot lines which are not perpendicular or radial may be permitted if the standard lot configurations would be awkward.

3-104.2 Lot lines shall be located at the top of slope because it is easier to maintain the slope from the down side of the slope. The lot line shall never be located on the slope. If a subdivision boundary line is at the toe of a slope, the toe shall be set back a sufficient distance to allow maintenance.

3-104.3 Lots shall not be divided by a City boundary or by a tax code boundary.

3-105 Lot Grading and Drainage

Each lot shall be graded so that storm water will drain from the back yard through the side yards and front yard, directly to the abutting street or to an approved drainage facility as approved by the City Engineer.

Within street tree easements, the maximum slope shall be 5:1 (up or down).

3-106 Street Trees

The developer shall be responsible for street trees in accordance with Section 18.28.10 of Chula Vista Municipal Code and shall be planted in accordance with approved City Landscape Improvement Plans. The use of approved herbicidal root barriers shall be included where required by the City Engineer to reduce the impact of root systems disrupting adjacent sidewalks and rights-of-way.

3-107 Miscellaneous

The design of the subdivision shall provide, to the extent feasible, for future passive or natural heating or cooling opportunities in accordance with the Section 66473.1 of the Subdivision Map Act.

GENERAL DESIGN CRITERIA
SECTION 3-200
HYDROLOGY/DRAINAGE/URBAN RUNOFF

3-200 HYDROLOGY/DRAINAGE/URBAN RUNOFF

3-201 General

This section establishes design criteria and procedures to be followed in the design of storm drain facilities.

3-201.1 **Definitions**

(1) Major Drainage Channel or System - A channel which drains an area in excess of 750 acres (3km2).

(2) Lateral Drainage Channel or System - A channel which drains an area in excess of 100 acres (0.40km2) but less than 750 (3km2) acres and empties into a major channel.

(3) Local Drainage Channel or System - A drainage system which collects local runoff from an area of less than 100 acres (0.40km2) and transports water to a lateral or major system.

(4) Drainage Channel or System - An open or closed conduit, improved or unimproved, designed for the purpose of collecting and transporting storm water runoff in such manner as to protect public and private property.

(5) Drainage Structure - A catch basin, outlet, inlet, headwall, spillway, energy dissipater, junction box, cleanout box, diversion box, etc., in a drainage channel or closed conduit system.

(6) Design Storm - A storm of a magnitude that may be expected to occur once during a specified number of years and resulting in the maximum storm water runoff to be anticipated once during that specified number of years.

(7) Dry Lane - A minimum street width that shall not be inundated at all times during a given design storm.

3-201.2 **General Responsibility for Drainage Facilities** - The developer of a proposed subdivision is required to:

(1) Accept any drainage entering a proposed subdivision and to provide adequate drainage facilities to convey all drainage on the property to discharge into, or connect to, the drainage facility into which the drainage would naturally flow;

(2) Provide on-site storm detention facilities such that the post-development flow rate for a given design storm does not exceed the pre-development flow rate at the outlet of the subdivision;

(3) Provide on-site erosion protection and desilting facilities

(4) Provide bonds for the cost of design and construction of any drainage facilities, including but not limited to off-site easements or facilities, necessary to accomplish these responsibilities.

(5) Provide all graded pads with adequate drainage facilities as approved by the City Engineer.

(6) Submit plans for all private storm drain systems for review and approval by the City Engineer.

3-201.3 **Design Flows**. Storm drain facilities shall be designed to convey design flows as follows:

(1) All major drainage channels shall be designed to discharge a 100-year ultimate storm, without static head;

(2) Lateral channels shall be designed to discharge a 50-year storm without static head at entrances and a 100-year ultimate storm utilizing available head without causing any damage to surrounding property;

(3) Local channels and drainage facilities within street right of ways shall be designed to discharge a 50-year storm utilizing available head without causing any property damage

(4) All storm drainage systems shall be designed so that the combination of the underground storm drain capacity and street overflow without dry-lane limitations shall convey the 100-year storm event without property damage.

(5) Where a sump condition exists and excess runoff has no alternate route, special design shall be required for the protection of property.

(6) At all major intersections (with major, prime or expressways), surface drainage shall be fully intercepted by properly sized inlets. All inlets adjacent to major intersections shall be designed to intercept a 50-year storm event.

3-202 Hydrologic/Drainage/Urban Runoff Reports

Hydrology and/or drainage reports shall be submitted as required per this manual. Reports shall include the following:

3-202.1 A suitable and recent topographic map that shows the following:

(1) On-site drainage maps at a minimum scale of 1"=100' (1cm=10m)

(2) Off-site drainage maps scales may vary depending on the size of the drainage area covered by the map.

(3) Shows appropriate contours on the map for the drainage on-site and extending beyond the subdivision boundary to indicate the drainage pattern.

(4) Indicate the existing basin boundaries and existing drainage facilities.

(5) Show proposed subdivision layout, proposed drainage systems, and proposed basin layout.

(6) Show quantity of flow and time of concentration at each inlet, outlet, interceptor, point of concentration or confluence points.

(7) All drainage area labels, points of concentration labels and system designations shall be shown in the logical order corresponding to the attached calculations.

(8) Indicate all crests, sags and street intersections with flow arrows.

(9) Compare pre-development and post-development flow rates for a given design storm at the outlet(s) of the subdivision.

(10) To mitigate runoff due to development, show on-site regional detention/desilting facilities that act as treatment control structural Best Management Practices (BMPs). Temporary and permanent detention/desilting facilities shall be shown on the plans.

3-202.2 **Report Calculations**

(1) Hydrology studies shall use appropriate methods and show in detail the determination of basin areas, basin flows, time of concentration, and all assumptions and physical data

(2) Hydraulic studies shall show that all conduits, channels and appurtenances are adequate to handle design flows. Studies shall include entrance and exit conditions, head losses, design flows and velocities, critical depth, scouring and silting velocities, energy and hydraulic gradient lines.

(3) Hydraulic studies shall also include a profile plot for all proposed channels showing channel flow line and water surface profile and hydraulic gradient line for the design-year storm event.

(4) Detention basin calculations shall include inflow and outflow hydrographs developed using an acceptable modeling procedure.

(5) Erosion control calculations shall show that silt and debris generation will be contained on-site using proposed measures including desilting and sedimentation basins.

3-203 **Hydrology**

3-203.1 **Previously Approved Reports** - Runoff quantities; as set forth or derived from the report prepared by Lawrence, Fogg, Florer and Smith titled "A Special Study of Storm Drain Facilities" on file in the office of the City Engineer may be used in the design of drainage facilities in Chula Vista. A hydrologic study prepared and approved at General Development Plan (GDP) or Specific Planning Area (SPA) plan may be used as determined by the City Engineer.

3-203.2 For local drainage basins, storm discharge flow may be estimated based on the Rational Method or the Modified Rational Method. For all lateral and major drainage basins the SCS method, U.S. Army Corps of Engineers HEC-1 computer method or other tabular or computer method may be used upon City Engineer approval.

3-203.3 **Rational and Modified Rational Methods**

(1) The rational method equation relates storm rainfall intensity (I), a selected runoff coefficient (C) and drainage area (A) to the peak runoff rate (Q):

$$Q = CIA \text{ (Empirical Units)}$$

where:

Q = Peak runoff in cubic feet per second
C = Runoff coefficient
I = Intensity, inches per hours
A = Drainage basin area in acres

Or

$$Q=0.278CIA \text{ (Metric Units)}$$

where:

Q = Peak runoff in cubic meters per second
C = Runoff coefficient
I = Intensity in millimeters per second
A = Drainage area in square kilometers

(2) Coefficient of Runoff: Consider probable development. Use highest number of the following values:

a)	Paved Surface	0.90
b)	Commercial Area	0.85
c)	Dense Residential (R2, R3)	0.75
d)	Normal Residential (R1)	0.65
e)	Suburban Property (RE)	0.55
f)	Barren Slopes Steep	0.80
g)	Barren Slopes Hilly	0.75
h)	" " Rolling	0.70
i)	" " Flat	0.65
j)	Vegetated Slopes Steep	0.60
k)	" " Hilly	0.55
l)	" " Rolling	0.50
m)	" " Flat	0.45

n)	Farm Land	0.35
o)	Parks, Golf Courses	0.30

NOTES:

Steep =	Steep, rugged terrain with average slopes generally above 30%.
Hilly =	Hilly terrain with average slopes of 10% to 30%.
Rolling =	Rolling terrain with average slopes of 5% to 10%.
Flat =	Relatively flat land, with average slopes of 0% to 5%.
Composite =	Where drainage areas are composed of parts having different runoff characteristics, a weighted coefficient for the total drainage area may be used.

The runoff coefficient for a basin should be a composite coefficient made of the many different runoff coefficients for the sub-areas of the basin per equation:

$$\frac{CA_T = C_1A_1+C_2A_2+\ldots CnAn}{n}$$

(3) Time of Concentration (t_c = minutes) is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration. With exceptions for limited natural watersheds, the time of concentration shall be calculated as follows:

a) $t_c = t_i + t_f$ where:

t_i = Initial time or overland flow time of concentration, the time required for runoff to flow to the first inlet or to the street gutter

t_f = Travel time of concentration, the time required for runoff to flow within street gutters to inlets, with channels or within storm drain pipes.

b) t_i may be calculated using the following natural watershed flow formula:

$$t_i = 60x\ [(11.9L^3)/H]^{0.385}$$

L = Length of water shed (miles)
H = Difference in elevation from furthermost point to the design point (feet).

If computed t_i is:	Add
Less than 5 Minutes	6 Minutes
5-10 Minutes	5 Minutes
11-15 Minutes	Use 15 Minutes
Greater than 15 Minutes	0 Minutes

NOTE: *Add minutes only when using this formula*.

c) or, t_l may be calculated using the following flow formula for developed areas with overland flow:

$$t_l = \frac{1.8(1.1-C)/D}{\sqrt[3]{S}} \quad \text{(in minutes)}$$

D = Length of watercourse (feet)
S = Slope (percent)
C = Runoff coefficient

d) For limitations in using these formulas, refer to the San Diego County Hydrology Manual.

(4) **Intensity of Rainfall** (I = inches/hr.) – The rainfall intensity (I) can be calculated using the following equation:

$I = 7.44\ P_6\ D^{-0.645}$

P_6 = adjusted 6-hour storm precipitation (If P_6 is not within 45% to 65% of P_{24}, increase or decrease P_6 as necessary to meet this criteria.)

D = duration in minutes (use t_c)

Note: (1) This equation applies only to the 6-hour storm.
(2) The 24-hour isopluvials are available from the County. The 6-hour isopluvials are in Chula Vista Design Standards.

(5) Area of water shed (A = acres), measured using suitable topographic map.

3-203.4 Other recognized hydrologic methods to determine runoff may be used, if substantiated, and approved by the City Engineer.

3-203.5 Whenever 6-hour storm precipitation rates (10, 50 or 100-year) are used to determine rainfall intensity, the Isopluvial Maps of the City of Chula Vista shall be used.

3-204 Drainage Criteria

The storm drainage system, consisting of surface and sub-surface facilities, shall be designed of sufficient capacity, without regards to dry-lane requirements, to convey the 100-year storm event without any damage to properties.

3-204.1 Street System

(1) For local drainage systems, inlet size and spacing shall be designed to intercept a 50-year storm without exceeding the City dry lane requirements and without causing property damage.

(2) Underground storm drain facilities, pipes and appurtenances shall be designed to discharge a 50-year storm runoff in an open channel flow condition. If offsite conditions create a seal, special pipe and/or joint design may be required for pressure flow.

(3) Dry-lane Requirements – In no case shall flow (Q_{50}) exceed the top of the curb.

a) Expressways, Six-lane Prime Arterials, and Six-lane Major roads shall maintain two driving lanes dry in each direction.

b) Four-lane Major, Class I Collector and Village Entry roads shall maintain a 12-foot dry lane on each side of centerline (or raised median)

c) Class II and Class III Collector, Secondary Village Entry, Promenade and Residential Streets' flow shall not exceed the top of curb

d) Industrial streets' flow shall not exceed the top of curb.

(4) All drainage shall be intercepted and collected at superelevated roadway transition sections where concentrated flows are not permitted to cross travel lanes under the design storm frequency for the street. Median inlets shall be designed and spaced so the lane adjacent to the median (number one lane or fast lane of traffic adjacent to the median) is free from drainage flow for the design storm frequency.

(5) Under no circumstances shall the flow on one side of given street at a set slope exceed the capacity of a 21 foot inlet (20' opening) to intercept 100% of the flow (Q_{50}).

3-204.2 **Storm Drain Facilities** - Specific methods of handling storm drainage are subject to detailed approval of the City Engineer based on currently accepted engineering practices supported by thorough engineering calculations. The following guidelines shall be used for work in the City of Chula Vista.

(1) The following Manning "n" factors are to be used:

a)

Pipe	n	
CMP, fully bituminous coated	0.024	(Not allowed in City maintained system)
CMP, fully asphalt paved	0.018	(Not allowed in City maintained system)
CMP, invert asphalt paved	0.023	(Not allowed in City maintained system)
RCP, All	0.013	
Cast in place	0.014	
PVC, ALL	0.012	

b)

Channel	n
P.C.C., formed, no finish	0.015
P.C.C., trowel finish	0.013
P.C.C., float finish	0.014
Gunite, no finish	0.019
Gunite, trowel finish	0.015

c) "n" factors for other materials or type of construction shall be as approved by the City Engineer.

(2) Public storm drain pipes shall be reinforced concrete pipe (RCP) unless otherwise stated below or approved by the City Engineer. Corrugated metal pipe (CMP) shall not be used unless specifically approved by the City Engineer.

(3) Minimum pipe diameter shall be 18" (46cm), minimum "D" load rating for RCP within the right of way shall be 1500.

(4) Storm drainage must be enclosed within a closed conduit for design runoff within a street right of way or City easement that can be carried in a 42" (107cm) diameter pipe or less.

(5) Minimum grade of storm drains and culverts shall be 0.5%.

(6) Maximum grade for RCP storm drains shall be 40%. PVC pipe may be used for grades greater than 40%.

(7) Maximum cleanout spacing:

a) Pipe diameters equal to or less than 30" (76cm): 300 feet (91m).

b) Pipe diameters greater than 30" (76cm): 800 feet (244m).

c) Storm drains constructed on grades greater than 20% shall use concrete anchors per Regional Standard S-9 at intervals of not more than 40 feet (12m).

(8) **Storm Drain Systems** – Shall be designed to convey runoff flow from inlets to cleanouts to the system outlet. Inlets will not be allowed on any system pipe larger than 18", unless approved by the City Engineer.

(9) **Pipe Radius/Watertight Pipe**

a) The radius of pipes in curves shall be based on standard or single bevel or double bevel pipe without breaking joints and shall comply with City of San Diego Drainage Design Manual, Table 1-103.7A. Pipe bevel and length shall be shown on plans.

b) The deflection angle at the inlet or cleanout shall be indicated on the plans and shall not be more than 10 degrees, unless special design is provided by the Engineer of Work on the plans.

c) For all storm drains under pressure, where the design HGL is 1-foot above the inside top of pipe elevation, watertight joints shall be used. Watertight joints shall also be used for storm drains constructed on grades of 20% or greater. If watertight, beveled pipe is proposed the Engineer of Work shall submit evidence that the proposed pipe is readily available. Further, the use of pipe collars will not be allowed in-place of manufactured watertight joints.

d) Prior to construction, the contractor shall submit lay out sheets to the City for the following cases:

i) where horizontal and vertical curves are combined;
ii) where beveled pipe lengths other than 4-feet or 8-feet is required to fit the curve.

(10) Easements:

a) Minimum width of storm drain easements shall be equal to the pipe diameter plus ten feet (3m) or a minimum of 15 feet (5m) in width, whichever is greater.

b) Minimum width of easements for improved channels shall be equal to the width of the improved channel plus ten feet (3m), or a minimum of fifteen feet (5m), whichever is greater.

c) Easements for natural channels shall include the inundation line for the design flood.

d) No fences, walls, or other construction shall be authorized within a drainage easement without the specific written approval of the City Engineer. Easement shall not split lot lines without specific written approval of the City Engineer.

e) No structures, poles, wires or other appurtenances shall extend, or pass over, the boundaries of any drainage easement without the specific written approval of the City Engineer.

f) Drainage easements for open channels shall not be included in building lot area calculations but may be included in setback requirements.

(11) **Safety fences or walls** shall be constructed alongside improved channels or as directed by the City Engineer.

(12) **Minimum freeboard** for channels and brow ditches shall be 6 inches (15cm). For supercritical velocities very close to the critical velocity, make the wall heights at least equal to the sequent depth. For curved alignments, add 1.0 foot (0.3m) above the calculated maximum superelevated water surface.

(13) For supercritical velocities very close to the critical velocity, make the wall heights at least equal to the sequent depth. For curved alignments, add 1.0 foot (0.3m) above the calculated maximum.

(14) Inlets and inlet transition shall not be placed within pedestrian crosswalks or driveways.

(15) Provide a minimum of 10 foot (3.0m) curb transition on both sides of inlets unless otherwise approved by the City Engineer.

(16) Grates will not be considered in calculations as capable of receiving any flow of water since they are easily clogged with debris.

(17) Grates shall be capable of being safely crossed by bicycles.

(18) Permanent improved access shall be provided for maintenance of all public drainage facilities.

(19) Where public storm drains outlet across private property or open space drainage facilities shall be designed to meet structural and hydraulic requirements of the City Engineer. Minimum freeboard of 6" to be maintained.

3-204.3 **Runoff Detention Basins**

(1) The rate of inflow to the storage facility (inflow hydrographs) shall be developed using an acceptable hydrologic procedure, and shall be based on the watershed conditions expected to prevail during the anticipated effective life of the structure. Permanent facilities shall assume ultimate development of the contributing areas.

(2) Detention facilities shall be designed to convey a minimum 100-year frequency storm with a minimum 1-foot (0.3m) freeboard and utilizing maximum expected siltation elevation.

(3) The maximum allowable release rate after development shall not exceed pre-development flow rates. The 10, 50, and 100 year storm events shall be analyzed when releasing flows into a natural channel or when requested by the City Engineer.

(4) Adequate energy dissipation features shall be incorporated to reduce outflow velocities to acceptable levels to avoid downstream erosion.

(5) An emergency or overflow spillway shall be provided to pass the design flow if the principal outlets become blocked.

(6) Outlet facilities shall pass all runoff from a 100-year frequency storm event within a reasonable length of time as determined by the City Engineer.

(7) The California Division of Safety of Dams has jurisdiction over detention facilities: a) meeting or exceeding 25 feet (7m) in height and storing 15 acre-feet (18,500 m^3) or more; or b) of any height storing 50 acre-feet (61,700 m^3)or more; or as determined by the State of California.

(8) Embankment slopes shall be planted to provide erosion protection as determined by the City Engineer.

(9) Developer shall be required to maintain detention facilities in accordance with conditions of tentative map approval. A maintenance

schedule shall be submitted for approval by the City Engineer prior to City acceptance of permanent facilities.

(10) Drainage structures within basins shall be provided with a reinforced concrete pad for maintenance purposes. The size, shape and location of the pad will be determined/approved by the City Engineer and Deputy Director of Operations.

3-204.4 **Sediment Basins** - Sedimentation basins shall be designed to provide adequate storage of sufficient duration to cause deposition of transported sediment as determined by the City Engineer.

(1) Vegetation shall be planted on all slopes within the subdivision and on the embankments of the basin to avoid erosion.

(2) Elevation marks shall be placed on the outlet riser pipe to monitor sediment levels.

(3) Sedimentation basins shall be maintained per a maintenance plan approved by, or as determined by the City Engineer.

(4) Pipe outlets shall consist of a perforated vertical pipe or box-type riser connected to a horizontal pipe that extends beyond the downstream embankment or that connects to an existing storm drain system.

(5) An emergency spillway shall be provided so that the capacity of the spillway alone will convey the 100-year design flood.

(6) Basins shall be designed to retain the design flood with a minimum 2-foot (0.6m) freeboard.

(7) Desilting basin(s) shall be designed using the standard equation:

$$As = 1.2Q/Vs$$

Where: *As* is the minimum surface area for trapping soil particles of a certain size; *Vs* is the settling velocity of the design particle size chosen; and Q = C x I x A where Q is the discharge rate measured in cubic feet per second; C is the runoff coefficient; I is the average precipitation intensity for the 10-year, 6-hour rain event and A is the disturbed and undisturbed areas draining into the sediment basin in acres. The design particle size shall be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01mm) particle, whichever is the largest, and the Vs used shall be 100 percent of the calculated settling velocity.

The length is determined by measuring the distance between the inlet and the outlet; the length shall be more than twice the dimension as the width; the depth shall not be less than three feet nor greater than five feet for safety reasons and for maximum efficiency (two feet minimum of settling depth plus the depth needed for sediment

storage). The sediment storage volume shall be determined using the "Basic Soil Loss" table (see below) or any other methodology approved by the City Engineer. The basin(s) shall be located on the site where it can be maintained on a year-round basis and shall be maintained on a schedule to retain the two feet minimum of settling depth.

A sediment basin shall have a means for dewatering within 3 to 7 calendar days following a storm event. Sediment basins may be fenced if safety (worker or public) is a concern, or as determined by the City Engineer.

BASIC SOIL LOSS TABLE
(in cubic yards)*

TRACT AREA (acres)	AVERAGE SLOPES					
	2%	5%	8%	10%	12%	15%
10	270	350	370	400	450	500
15	400	420	460	600	675	750
20	540	700	740	800	900	1000
40	1080	1400	1480	1600	1800	2000
80	2160	2800	2960	3200	3600	4000
100	2700	3500	3700	4000	4500	5000
150	4000	4200	4600	6000	6750	7500
200	5400	7000	7400	8000	9000	10000

* ***Engineer shall interpolate the figures listed in the tables as required.***

3-204.5 **Items to be Submitted with Drainage Calculations** - To ensure proper design and to simplify and expedite checking procedures, design calculations and related information are required for all drainage facilities including the following:

(1) Engineer's design calculations

(2) A suitable topographic map, which includes the subdivision and the total drainage basin with the sub-basins delineated and labeled.

(3) Calculations showing the determination of design flow, including all assumptions and physical data.

(4) Calculations showing that all conduits, channels, and appurtenances are adequate for design flows; to include entrance and exit conditions,

head losses, hydraulic jumps, critical depths, scouring and silting velocities, energy line elevation at the entrance, exit, and at each junction, bend, and angle point, and any other items affecting the functioning of the facility.

(5) A profile (to scale) showing the bottom of the channel or pipe, the hydraulic grade line, and the design flow and velocity.

(6) Calculations showing that the requirements for dry lanes will be met.

(7) All assumptions and input file information for computer programs along with a list of abbreviations and symbols used.]

3-205 **Storm Water Quality and Urban Runoff**

Prior to approval of any and all grading, construction, and building permits for the project, the Developer shall demonstrate to the satisfaction of the City Engineer compliance with all of the applicable provisions of the following and any amendments thereto.

(1) The City of Chula Storm Water Management and Discharge Control Ordinance (Chula Vista Municipal Code Section 14.20).

(2) NPDES Municipal Permit No. CAS0108758 (San Diego Regional Water Quality Control Board Order No. 2001-001).

(3) NPDES Construction Permit Co. CAS000002 (State Water Resources Control Board Order No. 99-08-DWQ), including modifications dated April 26, 2001, where applicable.

During project planning and design, the Developer shall incorporate effective construction and post-construction Best Management Practices and provide all necessary studies and reports as determined by the City Engineer demonstrating compliance with the applicable regulations and standards.

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3-200.11/ Eastlake South Greens (Unit 4) Developed Condition Hydrology Map

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GENERAL DESIGN CRITERIA
SECTION 3-300
SEWER DESIGN

3-300 SEWER DESIGN CRITERIA

3-301 **Design capacity** sewer trunks and mains; - The design criteria for public sewers is based on residential (R1) zoning and land use with a density of 4 dwelling units per acre and 3.3 persons per dwelling unit. Use these figures unless more accurate population or land use studies are available:

3-301.1 **Sewage production**

(1) Residential = 80 gallons (304 lpcd) per capita per day (gpcd) or 265 gallons (1006 liters) per EDU, per day.

(2) School flow:

a) Elementary Schools: 15 gpcd (57 lpcd).

b) Junior High and High Schools: 20 gpcd (76 lpcd).

(3) Commercial/Industrial/Church: 2,500 gpd/acre.

(4) Parks: 500 gpd/acre.

(5) Peak to average ratio: See CVDS 18.

3-301.2 Pipe design capacity based on Manning's flow equation:

(1) Use 1/2 full design flow for diameters up to and including 12 inches.

(2) Use 3/4 full design flow for diameters greater than 12 inches (30cm).

(3) "n" factors

a) for vitrified clay or reinforced concrete pipe:

1) n = 0.013 for pipes up to 21" (53cm) diameter;

2) n = 0.012 for pipes greater than 21" (53cm) diameter;

b) for PVC pipe, n = 0.012 for PVC pipe all sizes.

(4) Velocities:

a) Minimum = 2 feet/second (.61m/s). See Section 3-302.2(6) also.

b) Maximum = 12 feet/second (3.6m/s) (except as approved by City Engineer).

3-302 System Design Criteria

3-302.1 Minimum Pipe Sizes

(1) Public Sewer mains: 8 inches (20cm).

(2) Sewer laterals: 4 inches (10cm).

3-302.2 Grades

(1) Grades shall be determined by using design flow and velocities with the exception that minimum grade for 8" (20cm) sewer shall not be less than 0.4%.

(2) Sewer construction on grades of 20% or more, in newly compacted fills, shall use concrete anchors per Regional Standard Drawing No. S-9, at intervals of not more than 40 feet (12m), between anchors. Backfill shall be rounded over trench.

(3) Sewer constructed on grades of 20% or more, under conditions other than above, shall use cutoff walls per Regional Standard Drawing No. S-10, at intervals of not more than 40 feet (12m), between cutoff walls.

(4) Grades above 65% shall use cast iron pipe, Class 150, without bedding.

(5) Portions of sewer systems, which serve the equivalent of less than 10 residential lots, shall be constructed at a minimum grade of 2% if vitrified clay pipe is used or 1% for PVC pipe.

(6) Sewer mains that do not sustain 2 fps at peak flow shall be designed to have a minimum slope of 1%.

3-302.3 **Cradle/Encasement Requirements Depth** ;(depth of cover is measured from the top of pipe to finish grade)

(1) PVC - Per Manufacturer's Recommendations for long-term deflections not to exceed 5%.

3-302.4 **Trenching and Backfill** Regional Standard Drawing No. S-4.

3-302.5 **Deep Sewer Requirements**

(1) Deep Sewer Connections - Sewer mains greater than 15 feet (5m) deep with lateral connections shall be constructed in conformance with CVCS 14. Parallel sewer line shall be constructed for the full length of the deep sewer.

(2) Deep Sewer Laterals - Sewer laterals greater than 15 feet (5m) deep shall not be permitted without written approval of the City Engineer. A shallower, parallel sewer main shall be constructed to receive the lateral flows. The shallower sewer main shall connect to the deeper sewer at a manhole.

(3) Deep Sewer Mains - Sewer mains greater than 20 feet (6m) deep shall be constructed with PVC pipe, Class 900 for pipe diameters 12-inches or less and Class 905 for pipe diameters greater than 12-inches, from manhole to manhole.

3-302.6 **Manholes**

(1) Sewer manholes shall be per Regional Standard Drawing Nos. S-2 and M-3.

(2) Maximum distance between manholes = 400 feet (122m).

(3) Maximum distance from manholes to plugs on grades not exceeding 7% = 200 feet (61m).

(4) Manholes shall be provided as determined by the City Engineer.

(5) In a cul-de-sac, all sewers shall terminate in a manhole.

(6) Sewer Cleanouts shall be provided at a maximum of 100 foot (30m) intervals for sewer laterals.

(7) The manhole connecting a force main and gravity sewer and the four downstream manholes, shall be lined with T-lock or equivalent.

(8) Locking manhole covers per RSD M-4 shall be used on all major and prime streets at all intersections.

3-302.7 **Sewer Locations**

(1) **Sewer Trunks and Mains**

a) Sewer trunks and mains will normally be located on the centerline of streets for streets without medians unless otherwise approved by the City Engineer.

b) Sewer trunks and mains will normally be located in the center of the driving lane for streets with medians unless otherwise approved by the City Engineer.

c) The angle of connection in manholes for sewer pipes greater than 10" in diameter shall not exceed 45° and 30' minimum shall be provided between the manholes unless otherwise approved by the City Engineer. Manholes shall be centered in driving lanes.

d) Sewer mains between residential lots should be avoided to the maximum extent possible.

(2) **Sewer Easements**

a) Sewer easements shall be equal to the pipe diameter plus ten feet (3m) or a minimum of 15 (4.6m) feet in width, whichever is greater. Sewer easement shall not split residential lots unless specifically approved by the City Engineer.

b) Permanent obstructions within (or over) the easement which would hinder the maintenance of sewer facilities within the easement (i.e. fences, walls, steep slopes, overhanging eaves) are not allowed.

c) Easements shall be granted to provide access to all sewer manholes.

(3) Sewers that may be extended in the future shall be constructed to the boundary of the land being developed, or to the end of permanent improvements as determined by the City Engineer.

(4) Sewer and water lines paralleling each other shall be separated by a minimum of 10 feet (3m).

(5) Sewers crossing water lines shall cross under the water line.

(6) Deep sewer connections shall be in accordance with CVCS14.

3-302.8 **Sewer** constructed along curved alignments

(1) **Horizontal Alignment**:

a) Minimum pipe centerline radius shall conform to "Green Book" specifications (Table 306-1.2.13 (C)). Lesser radii may be approved in accordance with manufacturer's specifications upon approval of the City Engineer.

b) Curves of radii exceeding 200 feet (61m) may be formed by the deflection of each joint or by use of specially beveled pipe.

c) Curves of radii equal to 200 feet (61m) or less will use two-foot length pipe for every other length when using joint deflections.

d) Short radius curves may be formed by the use of short pipe with deflected joints, beveled pipe, or a combination of both.

(2) **Vertical Curvilinear Alignment**. Although straight grades are preferred between manholes, vertical curves, using criteria given for horizontal alignment, above may be used upon approval by the City Engineer.

3-302.9 **Sewer Laterals**

(1) All sewer laterals shall be in accordance with Regional Standard Drawing Nos. S-13.

(2) Deep sewer lateral connections shall be in accordance with CVCS 18. Sewer laterals deeper than 15 feet are not allowed without written approval of the City Engineer.

(3) Minimum grade for sewer laterals is 2%, unless otherwise approved by City Engineer.

(4) Each sewer lateral shall have one sewer cleanout placed at the property line per CVCS-20 and CVCS-21. If the edge of sidewalk is at the property line, the cleanout shall be placed within the adjacent general utility easement.

(5) To the maximum extent possible, sewer laterals shall not be placed under driveways.

3-302.10 Private Sewers

(1) Private sewer mains shall be designed to public standards and shall be submitted for review and approval by the City Engineer.

3-303 Force Sewer Mains and Sewer Pump Stations

3-303.1 General

(1) Construction of force sewer mains and sewage pump stations shall be avoided unless other options are unavailable. Permanent sewer pump stations are not desirable and generally will not be approved. Permanent or temporary sewer pump stations may be approved only in accordance with the provisions of City policy No. 570-03, adopted by Resolution No. 17491.

(2) Easements shall be granted to the City of Chula Vista for all temporary pump stations, as deemed necessary by the City Engineer. Documents granting said easements, shall be recorded prior to City acceptance of the pump station. Permanent pump stations shall be located on parcel(s) granted, or owned, in fee to the City of Chula Vista.

(3) Developer shall enter into agreements with the City of Chula Vista that define pump station maintenance, operation, billing, responsibilities, and acceptance of temporary pump stations. Said agreement shall be approved by the City Council and be in accordance with City Policy No. 570-03.

(4) Representatives from the Engineering Department, Public Works Operations, developer, and contractor shall meet prior to start of construction of pump stations.

(5) Pump station plans shall include a site plan, pump curves, specifications, details, profiles, pump head, pump horsepower, pump capacity, cost estimate, emergency storage and complete electrical layout.

(6) Plans for working on existing pump stations during mechanical re-fit, new connection, etc., shall include a note indicating "the Contractor shall provide continuous sewer service including source of power", to insure that residents relying on the pump station will maintain sewer service.

(7) All plans must be approved by the City of Chula Vista Engineering, Operations, Building and Housing, and Planning departments.

(8) Operational checks and tests shall be performed on site with representatives from Public Works Operations (pump operators, electricians, and sewers), Public Works Inspection, the developer, and equipment suppliers.

3-303.2 **General Pump Station Criteria**

(1) Site Work - Site shall be landscaped outside the fence line. Structures and fences/walls shall be constructed, and painted in a style to blend with the surrounding neighborhood, subject to approval by the City of Chula Vista. The area inside the fence shall be paved and shall drain to an approved drainage structure at a minimum slope of 2%.

(2) Access - Station access shall be provided in accordance with the following criteria:

a) Access shall be provided around the entire station.

b) An access road with a minimum width of 20 feet and maximum slope of 15% shall be provided. The station shall have parking for two large trucks with a turnaround. No private gates will be permitted across access roads.

c) Station shall be fenced or walled with locking gate to prevent unwanted entry. Fencing or wall shall be in an acceptable manner that blends in with the surrounding community. Fencing shall have three-strand barbed wire on top.

d) If access incorporates a tunnel, the dimensions shall be 20 feet wide by 14 feet high.

e) A minimum 62 ft. driveway radius sweep is required to accommodate large vehicles.

(3) Every pump station shall be provided with emergency storage capacity of a minimum of 6 hours at average ultimate flow. Additional storage capacity may be required when station is located close to a

water supply reservoir, the bay front, or any other water way. In areas with limited space, the emergency storage may be complied with by providing complete redundancy (including force main and plumbing), pending City approval. Emergency storage reservoirs shall be constructed of Portland cement concrete (P.C.C.).

(4) Each pump station shall be provided with two independent power sources. This shall be accomplished by providing an on site diesel generator. Generator switching equipment shall be located in a building.

(5) Below ground stations shall be of fiberglass construction. The maximum allowable cover over a fiberglass enclosure shall be no deeper than 20 feet from top of enclosure.

(6) Phone and water services shall be provided to all stations.

(7) Screen openings for vents and all other screened areas shall be of sufficient size to prevent infestation from all pests, including bees.

(8) A door or removable ventilation louver shall be installed in generator buildings and be large enough to accommodate removal of the generator.

(9) All stations shall have exterior lighting near the wet well and pump house. Lamps shall be 250 watt high pressure sodium.

(10) Pipes shall be color coded with flow arrows for direction of flow and type of liquid or gas.

(11) All outside doors and frames shall be corrosion and vandal resistant.

(12) Guard rails with toe boards shall be installed around all floor openings and shall have two chains fitted with snap hooks and eyes. All guardrails, chains, snap hooks, eyes and toe boards shall be of non-corrosive materials.

(13) Shower, sink, and eye wash station shall be provided at each station.

(14) Fire extinguisher shall be provided as per Fire Code. Type 2A10BC, one per every 3,000 sq. ft. of building area. A minimum of one fire extinguisher per station.

3-303.3 **Other Requirements**

(1) A dehumidifier shall be incorporated into all below ground stations.

(2) A binoxide odor control system shall be installed at all pump stations.

(3) Intake air shall be ducted near floor and exhaust air should be near ceiling.

(4) Intake and exhaust points shall be as diagonally opposite as possible.

(5) Both intake and exhaust outside outlets shall be above ground.

(6) Blower and ducting shall be made out of corrosion resistant materials (PVC acceptable).

(7) Screening over ventilation openings shall be made of corrosion resistant materials.

(8) Certified performance test of ventilation system is required for acceptance.

3-303.4 **Alarms**

(1) Alarms - Pump station shall have alarms that shall be telemetered to the designated monitoring station.

(2) Alarms shall be of identical type as City currently utilizes for lift station monitoring. Contact Public Works Operations for specifications.

(3) The station shall be equipped with alarms sound for pump failure, high wet well, low wet well, power failure, generator failure, dry well flooded, and any alarms necessary for equipment safety, or particular installations.

(4) Alarm equipment shall be housed in a water tight, dust proof enclosure.

(5) All telemetry wiring shall be per phone company specifications.

(6) The following is required for alarm hookup:

a) Station must have address.

b) Telephone Company must already have phone lines pulled or laid up to the alarm/pump station. Contractor/developer shall pay for and arrange with Pacific Bell.

c) Conduit from pump station to Telco phone lines with an above ground riser with pull rope.

(7) After alarm is connected, connect the Information Systems:

a) Arrange for Telco to install alarm circuit on existing alarm circuit.

b) Contractor or other to meet Telco by arrangement to have access to alarm station.

c) Notify Public Works Operations of addition of new alarm circuit.

d) Contractor installs alarm electronics at pump station and at 276 Fourth Avenue, or as otherwise directed by Public Works Operations.

e) Communication Division connects new alarm signal to Police Dispatch alarm panel.

(8) Public Works/Engineering will provide account number for City and Pacific Bell charges.

3-303.5 **General Equipment Criteria**

(1) City shall be provided with four complete sets of manufacturer's brochures, technical data, operating and maintenance manuals, for all equipment and controls.

(2) A maintenance agreement for all generators installed shall be for one year from time of acceptance of station and shall cover transfer switch.

(3) A 24-hour call list for generator maintenance under warranty and Maintenance Agreement shall be provided.

(4) Training, for maintenance personnel, shall be provided by a manufacturer's representative.

(5) Lifting eyes shall be installed above all equipment.

(6) All equipment shall have adequate clearance to perform maintenance and repair work.

(7) Lighting shall be a minimum 40 foot candles at the machine level and be shadow free.

(8) Guards shall be installed around all moving parts of equipment as required by safety codes and have appropriate safety labels.

(9) All concrete floors shall be treated with an approved sealant and walking areas shall be non-slip.

(10) Step and walkways shall have non-slip surfaces.

3-303.6 **Electrical/Controls**

(1) Panels and sub-panels shall be Square "D" or an approved equal, approved by City Electrician.

(2) All building wiring shall be THHN insulation grade 90øC/194øF minimum and be copper only, and usable in damp and dry locations.

(3) An electronic bubbler system with a backup mercury float switch shall be used for level control.

(4) Each pump shall have hour meter reading in 1/10th hours.

(5) Panel installed shall have indicator light indicating which pump is in operation.

(6) Panel shall display wet well level.

(7) Control panel shall not sit on floor. Mounting shall be at least 3 inches from floor.

(8) All controls shall be vapor proof and conform to all Safety Codes.

(9) Air lines shall have a water trap between compressor and controls.

3-303.7 **Pumps**

(1) Pump stations shall use Gorman-Rupp pumps or an equivalent approved by City of Chula Vista, Public Works Operations.

(2) Minimum size self-priming pump will be a 3-inch with the ability of passing a 2-1/2 inch sphere.

(3) Submersible pumps shall be avoided when a self-priming pump can be used.

(4) Submersible pumps may only be installed with a minimum of 100 feet TDH (Total Dynamic Head). They must be a minimum size of 6 inches with the ability to pass a 3-inch sphere. Submersibles shall be avoided when a self-priming pump can be used.

(5) The minimum running time for each pump cycle is 5 minutes.

(6) Pump station capacity call be based on peak flow plus a 30% safety factor (Qdesign = 1.3 x Qpeak).

(7) Each pump station shall be equipped with one standby (back-up) pump in addition to the primary pumping unit(s).

(8) The maximum pump motor speed shall be 1,800 RPM.

(9) The most efficient pump performance shall be at the design TDH (Total Dynamic Head).

(10) Each pump shall be lab tested with certified copies of the performance test furnished to Public Works Operations.

(11) All self-priming pumps shall have air release valves 1-inch minimum.

(12) Any drain lines shall be 1-1/4 inch minimum.

(13) Pumps shall have oil filled suction and discharge gauges reading in feet of water (exception of suction gauges on submersible pumps).

(14) Pump motors shall be UL (Underwriters Laboratory) rated or rating acceptable to City Engineer.

(15) Any non-sewage pumps and piping shall be epoxy coated to prevent corrosion.

3-303.8 **Plumbing**

(1) Discharge lines and manifolds shall be supported and braced.

(2) Sleeves shall be used for wall penetration for pump suction and discharge lines and shall be sealed air-tight.

(3) Water service shall be 1-inch minimum and have an approved backflow prevention device.

(4) Sump lines shall be 1-1/2 inch diameter minimum.

(5) In manifolds, "wyes" are required and shall be the same size as manifold.

(6) Valves:

a) Pump isolation, suction, discharge, and sump line valves shall be plug valves. Valves on forced main and influent to the exterior of the pump station or wet well shall be plug valves.

b) All gauge lines shall have ball valves.

c) All piping either entering or leaving station shall have plug valves on the exterior of station.

d) All valves shall have hand operators geared as required, per manufacturer's recommendations.

e) Check valves shall be between pump and discharge line plug valve and have external spring loaded arm.

f) All valves needing extensions shall have the extensions supplied by contractor.

g) All valves shall be labeled as to their type, function, and operational direction.

3-303.9 **Pump Stations - Dry & Wet Wells**

(1) All piping and conduits shall be adequately sealed so that no gasses can seep into dry well from wet well.

(2) Dry well requires minimum six changes of air per hour, running continuously, and 15 air changes per hour intermittent ventilation to be interlocked with the light switch.

(3) Pump Stations - Wet Well:

a) Wet wells shall be physically separated from pump area excepting submersible stations.

b) Wet well shall have a read out in inches of water.

c) Wet well shall be completely lined either with T-lock or an approved equal.

d) Wet well floor shall be sloped toward suction sump at a minimum of 1/8 inch per foot.

e) Sewage influent shall be above the high water operating level in order to allow for free flow of the gasses into the wet well.

f) In wet wells incorporating large diameter retention areas, a smaller diameter operating area shall be below the larger retention area, keeping the operating volume of sewage to minimum.

g) Wet well shall be sealed on exterior surface.

h) Wet wells shall be vented. Pump stations receiving flow from trunk sewers (18 inches or larger) shall have positive ventilation. Other pump stations may have passive ventilation.

GENERAL DESIGN CRITERIA
SECTION 3-400
STREET AND ROAD DESIGN

3-400 STREET AND ROAD DESIGN - GENERAL

The standards in the following sections are minimum standards prepared by the Engineering Division, Public Works Department, for the information and guidance of both City Staff and those professionals in the private design sector responsible for the design of the City's streets. The street design standards establish uniform policies and procedures to carry out the City's General Plan, and Circulation Element goals. It is neither intended as, nor does it establish, a legal safety standard. For more detailed information refer to the City of Chula Vista Street Design Standard Policy as adopted by City Council per Resolution 15349 on October 17, 1989.

The following standards are applicable primarily to areas without unusual terrain problems and in developed areas of the City where existing buildings do not create obstacles in obtaining needed right-of-way. In difficult terrain and in older developed areas where flexibility is required, deviations from these standards may be approved by the City Engineer, only after demonstration to the City that these standards are not reasonably achievable. The request for deviation must be prepared by a registered civil engineer and show that the safety of the public will not be reduced and that the deviation conforms with common engineering practice and standards.

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3-401 General Design Criteria

Streets must be designed as required for the various functional classifications. Whenever expected ADT is greater than the approximate maximum ADT stated, the street shall be designed to a higher satisfactory functional classification. The widths and configurations of streets shown in this manual are related to the estimated future average daily traffic (ADT) for level of service (LOS) "C".

3-401.1 **Expressway**

Expressways are designed to move high volumes of traffic between major generators and to distribute traffic to and from the freeway system and provide intercommunity access. See Chula Vista Design Standard CVD-ST01 for typical cross section.

(1) Design Features

There are three primary design features which contribute to higher roadway capacity on the expressway facility. These capacity increasing features include one mile (2km) spacing of major crossing intersections, grade separated urban interchanges and restricted access.

(2) Intersections/Crossings

a) Major crossings shall be spaced no less than one mile (2km) intervals except upon approval of the City Engineer. These major crossings shall be controlled by grade separated urban interchanges. Also, at locations where the expressway facility crosses regional freeways, special interchange geometric configurations may be required to carry the high volumes anticipated on the expressway facility.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the expressway corridor. No median openings shall be permitted.

c) Pedestrian crossing demand should be well planned, focused and controlled to allow the periodic placement of mid-block overpasses to link major generators and attractors where appropriate.

(3) Access

Vehicular access to and from the expressway from minor streets or abutting properties shall typically be restricted. Limited street or driveway access will only be considered by the City Engineer if all other feasible means of obtaining alternate access have been exhausted.

(4) Landscaping - Expressways shall provide landscaped buffer areas.

(5) Parking/Bicycles - All non-motorized travel and parking on these facility shall be prohibited with the exception of emergency parking.

(6)	Design ADT	-	70,000
(7)	Minimum design speed	-	60 mph (96kph)
(8)	Curb-to-curb	-	104' (32m) (includes a 16'(5m) raised median)
(9)	Right-of-way	-	128' (39m)
(10)	Maximum grade	-	6%
(11)	Minimum curve radius	-	1,500' (457m) with 5% super-elevation; 2,500' (762m) with no superelevation

3-401.2 **Six-lane Prime Arterial**

The prime arterials are designed to move traffic between major generators. See CVD-ST01 for typical cross section.

(1) Intersections/Crossings

a) Typically, intersections shall be spaced no closer than 660 feet (200m) and signalized intersections shall be spaced no closer than one-half mile (804m) intervals.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the arterial corridor. No median openings shall be permitted except at major intersections.

c) Widen all approaches to intersections as per CVD-ST12 in order to provide for additional lanes as per CVD-ST11.

d) Pedestrian crossing demand should be well planned, focused and controlled to allow for crossings at major signalized intersections as well as the periodic placement of mid-block overpasses to link major generators and attractors where appropriate.

(2) Access

Vehicular access to and from prime arterials from minor streets or abutting properties shall typically be restricted. No direct access from single-family residential homes is allowed. Should a property have frontage only on the prime arterial facility, driveway or minor street access shall be permitted at locations deemed appropriate by the City Engineer. These access points shall be limited to right turns in and right turns out only. Also, these access points shall require additional roadway width to provide for acceleration and deceleration lanes.

(3) Landscaping - Landscaped buffer areas shall be provided on prime arterial facilities.

(4) Parking - Parking on this facility shall be prohibited with the exception of emergency parking.

(5) Bicycles - Bike lanes shall be provided on prime arterial facilities in conformance with routes identified in the Bicycle Element of the Chula Vista General Plan.

(6)	Design ADT	-	50,000
(7)	Minimum design speed	-	55 mph (88kph)
(8)	Curb-to-curb	-	104' (32m)(includes a 16' (5m) median)
(9)	Right-of-way	-	128' (39m)
(10)	Maximum grade	-	6%
(11)	Minimum curve radius	-	1,150' (350m) with 5% super-elevation; 2,000' (610m) without superelevation

3-401.3 **Six-lane Major**

Major streets are primarily designed to distribute localized trips. See CVD-ST01 and CVD-ST02 for typical cross sections.

(1) Intersections/Crossings

a) Typically, intersections shall be spaced no closer than 660 feet (200m) and signalized intersections shall be spaced no closer than one-quarter mile (402m) intervals.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the major corridor. One mid-block median opening may be permitted with approval of the City Engineer. Such intersections and any resulting signals shall not negatively impact signal progression and traffic flow on major streets. This opening shall typically be spaced at the mid-point between the major intersections (approx. 660' (200m)). The specific location of these median openings shall be determined by the City Engineer.

c) Widen all approaches to intersections as per CVD-ST13 and CVD-ST14 in order to provide for additional lanes, as per CVD-ST11.

d) Pedestrian crossing demand should be well planned, focused and controlled to direct pedestrians to designated crossing points at signalized intersections.

(2) Access

Vehicular access to and from six-lane major streets from abutting properties (commercial) shall typically be controlled but not restricted. No direct access from single-family residential homes is allowed. Full access median openings will be permitted on these facilities only at locations specified by the City Engineer and under conditions established by the City.

(3) Landscaping - Six-lane major arterials shall provide landscaped buffer areas.

(4) Parking - Parking on these facilities shall typically be allowed. However, parking at critical locations may be denied as deemed appropriate by the City Engineer.

(5) Bicycles - If a bike lane is to be provided on this six-lane major facility and parking is to be retained, an additional 10 feet (3m) of right-of-way will be required to allow for a 10-foot (3m) widening of the roadway cross section.

(6)	Design ADT	-	40,000
(7)	Minimum design speed	-	45 mph (72kph)
(8)	Curb-to-curb	-	104'(32m) (includes a 16' (5m) raised median)
(9)	Right-of-way	-	128' (39m)
(10)	Maximum grade	-	7%
(11)	Minimum curve radius	-	1,100'(335m) with no superelevation

3-401.4 **FOUR-LANE MAJOR**

Major streets are primarily designed to distribute localized trips. See CVD-ST02 and CVD-ST21 for typical cross section.

(1) Intersections/Crossings

a) Typically, intersections shall be spaced no closer than 660 feet (200m) and signalized intersections shall be spaced no closer than one-quarter mile (402m) intervals.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the arterial corridor. One mid-bloc median opening may be permitted only with approval of the City Engineer. Such intersection and any resulting signals shall not negatively impact signal progression and traffic flow on major streets. This opening shall typically be spaced at the mid-point between the major intersections (approx. 660' (200m)). The specific location of these median openings shall be determined by the City Engineer.

c) Widen all approaches to intersections as per CVD-ST15 & 16 in order to provide for additional lanes, as per CVD-ST11.

d) Pedestrian crossing demand should be well planned, focused and controlled to direct pedestrians to designated crossing points at signalized intersections.

(2) Access

Vehicular access to and from four-lane major streets from abutting properties shall typically be controlled but not restricted. No direct access from single-family residential homes is allowed. In developed areas direct access from single-family homes may be allowed as determined by City Engineer. Full access median openings may be permitted at locations as determined by the City Engineer and under conditions established by the City.

(3) Landscaping - Four-lane majors shall provide landscaped buffer areas.

(4) Parking - Parking on these facilities shall typically be allowed. However, parking at critical locations may be denied as deemed appropriate by the City Engineer.

(5) Bicycles - If a bike lane is to be provided on this four-lane major facility and parking is to be retained, an additional 10 feet (3m) of right-of-way will be required to allow for a 10-foot (3m) widening of the roadway cross section.

			Commercial Areas (frequent driveways)	Low Density Areas
(6)	Design ADT	-	28,000	30,000
(7)	Minimum design speed	-	45 mph (72kph)	55mph (88kph)
(8)	Curb-to-curb	-	80'(24m) (includes 16' (5m) median)	80'(24m) (includes a 16' (5m) median)
(9)	Right-of-way	-	104' *(32m)	104' (32m)
(10)	Maximum grade	-	7%	7%
(11)	Minimum curve -	-	1,100' (335m) with no super-elevation	1,150' (350m) with 5% super elevation; 2,000' (610m) with no super-elevation

3-401.5 **Class I Collector Streets**

Class I collector streets serve primarily to circulate localized traffic and to distribute traffic to and from arterials and major streets. Class I collectors are designed to accommodate four lanes of traffic, however, they carry lower traffic volumes at slower speeds than major arterials, and they have a continuous left turn lane separating the two directions of traffic flow. See CVD-ST02 and CVD-ST21 for typical cross section.

(1) Intersections/Crossings

a) Typically, intersections shall be spaced no closer than 660 feet (200m) and signalized intersections shall be spaced no closer than one-quarter mile (402m) intervals.

b) Widen all approaches to intersections in developed areas west of I-805 as per CVD-ST016 in order to provide for additional lanes, as per CVD-ST11.

c) In special cases if no abutting property access is allowed, the strip's median, with approval of the City Engineer, can be reduced to 4 feet (1.5m).

(2) Access

Access to and from Class I collector streets from abutting properties shall typically be controlled but not restricted. No direct access from single-family residential homes is allowed. In developed areas, direct access from single-family homes may be approved by the City Engineer.

(3) Parking - Parking on this facility shall typically be allowed. However, parking at critical locations may be denied as deemed appropriate by the City Engineer.

(4) Bicycles - If a bike lane is to be provided in conformance with the Bicycle Element on this Class I facility and parking is to be retained, an additional 10 feet (3m) of right-of-way will be required to allow for a 10-foot (3m) widening of the roadway cross section.

(5)	Design ADT	-	22,000
(6)	Minimum design speed	-	45 mph (72kph)
(7)	Curb-to-curb	-	74' (23m)
(8)	Right-of-way	-	94' (29m)
(9)	Maximum grade	-	8%
(10)	Minimum curve radius	-	700' (214m) with 5% superelevation;1,100' (335m) with no superelevation

3-401.6 **Class II Collector Streets**

Class II collector streets with two-way center turn lanes serve primarily to circulate localized traffic and to distribute traffic to and from arterials, major streets and Class I collectors. Class II collectors are designed to accommodate two lanes of traffic, however, they carry lower traffic volumes at slower speeds than Class I collector streets.

This type of facility provides access to properties and circulation to residential neighborhoods. See CVD-ST03 and CVD-ST22 for typical cross section.

(1) Intersections

a) Minimum distance between centerline of intersections shall be 250 feet (76m)

b) Widen all approaches to intersections in developed areas west of I-805 in conformance with CVD-ST16 to provide additional lanes as shown in CVDS-ST11.

(2) Access - Access to and from Class II collector streets from abutting properties shall be permitted at locations approved by the City Engineer.

(3) Parking - Parking on this facility shall typically be allowed. However, parking at critical locations may be denied as deemed appropriate by the City Engineer.

(4) Bicycles - If a bike lane is to be provided on this Class II facility and parking is to be retained, an additional 10 feet (3m) of right-of-way will be required to allow for a 10-foot (3m) widening of the roadway cross section.

(5)	Design ADT	-	12,000
(6)	Minimum design speed	-	30 mph (48kph)
(7)	Curb-to-curb	-	52' (16m)
(8)	Right-of-way	-	72' (22m)
(9)	Maximum grade	-	10% residential zone
(10)	Minimum curve radius	-	300' (91m) with 4% superelevation; 450' (138m) with no superelevation

3-401.7 **Class III Collector Streets**

Class III collector streets circulate localized traffic as well as distribute traffic to and from arterials and other collectors to access residential areas. Class III collector streets accommodate low volume levels and the use of this facility as a carrier of through traffic should be discouraged by its design. See CVD-ST03 and CVD-ST22 for typical cross section.

(1) Intersections - Minimum distance between centerline of intersections shall be 250 feet (76m).

(2) Parking - Parking on this facility shall typically be allowed. However, parking at critical locations may be denied as deemed appropriate by the City Engineer.

(3) Bicycles - If a bike lane is to be provided on this Class III facility and parking is to be retained, an additional 10 feet (3m)of right-of-way will be required to allow for a 10-foot (3m) widening of the roadway cross section.

(4)	Design ADT	-	7,500 with no driveway access from abutting property. 5,000 with driveway access from abutting property
(5)	Minimum design speed	-	30 mph (48kph)
(6)	Curb-to-curb	-	40' (12m)
(7)	Right-of-way	-	60' (18m)
(8)	Maximum grade	-	12%
(9)	Minimum curve radius	-	450' (138m) with no superelevation; super-elevation may be approved by the City Engineer where there is no residential driveway access.

3-401.8 **Residential Streets**

(1) See CVD-ST03, CVD-ST04, CVD-ST22, and CVD-ST23 for typical cross section.

(2) Minimum distance between centerline intersections shall be 150 feet (46m).

(3) Grade segments in excess of 12% shall not exceed 300 feet (91m) in length.

(4) Minimum radius for cul-de-sacs with a maximum length of 500 feet (152m) may be 100 feet (30m) and a maximum central angle of 45° subject to the approval of the City Engineer. The minimum tangent length between horizontal curves of radius 100 feet (30m) shall be 150 feet (152m).

(5) Average grade over any 1,000-foot (305m) segment shall not exceed 10%.

(6) Portland cement concrete pavement shall be required for grades in excess of 12%.

(7)	Design ADT	-	1,200
(8)	Minimum design speed	-	25 mph (40kph)
(9)	Curb-to-curb	-	36' (11m) (34' (10m) single loaded)
(10)	Right-of-way	-	56' (17m) (50' (15m) single loaded)
(11)	Maximum grade	-	15%

(12)	Minimum curve radius	-	200' (61m) with no super-elevation

3-401.9 **Industrial Roads**

(1)	See CVD-ST04 and CVD-ST23 for typical cross section.		
(2)	Minimum distance between centerline intersections is 300 feet (91m).		
(3)	Design ADT	-	2,000
(4)	Minimum design speed	-	30 mph (48kph)
(5)	Curb-to-curb	-	52' (16m)
(6)	Right-of-way	-	72' (22m)
(7)	Maximum grade	-	7%
(8)	Minimum curve radius	-	450' (138m) with no super-elevation

3-401.10 **ADDITIONAL DESIGN CRITERIA**

(1) No transition shall be allowed on horizontal curves except upon approval of the City Engineer.

(2) Circular curves shall be used for all horizontal changes of centerline direction.

(3) Horizontal curves for median curbs shall not be less than the center line radius less the offset.

(5) Vertical curves shall be used when change in grade exceeds 1% in sags and 0.5% on crests.

(6) Angles between centerlines of intersecting streets shall be as close to right angles as possible, but in no case less than 70° or greater than 110°. Streets shall intersect only in tangent sections. Tangent lengths shall extend a minimum of 100'(30m) beyond the point of curb return on each leg of an intersection except as approved by the City Engineer.

(5) Intersection sight distance shall comply with the current CALTRANS Highway Design Manual and Chula Vista Design Standards.

(7) A minimum of one on-street parking space (20 feet(6m)) shall be provided along the frontage of each residential lot. Equivalent on-street parking space may be acceptable upon approval of the City Engineer.

(8) All streets with controlled access devices, such as gates, shall contain the following features:

a) Gates shall be 150 feet (45m) away from the extension of the intersecting street curbline, except upon approval by the City Engineer.

b) All motorized gates shall include a knox switch and opticom device with manual override approved by the City Fire Marshal.

c) A turnaround shall be provided at the location of the gate. The size and location of said turn-around and gate, shall be approved by the City Engineer.

(9) Compound curves shall not be allowed.

(10) The maximum centerline grade for permanent cul-de-sac streets within the turnaround area shall be 5%, the maximum centerline grade for temporary cul-de-sacs shall be 8%.

(11) The minimum gutter grade in the turn around segments of cul-de-sacs shall be 1%.

(12) The maximum longitudinal street grade or cross slope at 90 degrees to a cross gutter shall be 3% for 25 feet (8m) from any edge of the cross gutter. This grade may be increased at residential intersections, subject to approval of the City Engineer, if the intersection is designed as a maximum comfortable acceleration sag vertical curve designed for a minimum speed of 25 mph (40kph) [i.e., Length of vertical curve = 3.125 feet x Difference in approach grades] and the maximum cross slope in any driving lane is 5%.

(13) The maximum grade at any intersection of two streets shall be 6% within the intersection and for at least 50 feet (17m) past the nearest curb lines of the intersecting street as long as ADA requirements for sidewalks, etc. are met.

(14) Pavement cross slopes shall be in accordance with CVD-ST01 through ST04 and CVD-ST31 through CVD-ST35. The minimum cross slope shall be 2% except at intersections where the cross slope may be reduced to 1%. The maximum cross slope shall be 5% on any street whose cross section varies from said construction standards.

(15) At major street to major street intersections and above, the pavement cross slope shall be reduced to 1% through the intersection.

(16) Portland Cement Concrete monolithic curbs, gutters, and sidewalks are required along all streets with the exception that the City Engineer may approve reduction of sidewalk requirements in those areas that are deemed unnecessary by the City Engineer.

(17) Pedestrian ramps in accordance with the San Diego Regional Standard Drawings shall be constructed in the following locations on all streets unless otherwise approved by the City Engineer:

a) All curb returns

b) At t-intersections opposite one curb return.

(18) Driveway approaches for all residential and commercial applications shall conform to CVCS1, unless otherwise approved by the City Engineer.

(19) Cross gutters will not be allowed at signalized intersections unless otherwise approved by the City Engineer.

(20) Curb returns shall be checked for constructability. When the forms are "warped" in the field, it will result in severe grade breaks, bad drainage and a poor driving lane. The calculated PI of the curb return shall be determined from the extended curb grade of the main street. The straight grade from the PCR to the calculated PI of the curb return shall be shown on the plan. The grade breaks from this grade and the grade of the tangent portion of the curb at the PCR shall not exceed 1%. The curb return shall be designed in a plane.

(21) The maximum grade along the curb of a curb return shall not exceed 6% and the sidewalk in all places shall not exceed 8.33%.

(22) Lighted sag vertical curves, when sight distance requirements do not govern, shall be of sufficient length to produce no perceptible acceleration. The minimum length of vertical curve shall be $L=1.2\ AV^2$, where L is the length of the vertical curve in feet, A is the algebraic difference in grades in decimal and V is the design speed in miles per hour. This formula may be used at intersections for Residential and Class III Street classifications, or equivalent, only if other design options are not feasible.

(23) The safe speed of vertical curves, as designed, shall be shown on the plans (V=X mph (or kph) and should equal or exceed the design speed for the classification of the road.

(24) In new streets or existing streets with storm drain, median drainage shall be provided per CVD-ST11-Alternate A

(25) Bus Turnout Criteria – Bus turnouts shall be considered if one or more of the following factors are present:

a) Location convenient to park & ride facilities, intermodal transfer facilities, and/or transfer facilities between bus services.

b) Location serves major pedestrian traffic generators (i.e. village centers, shopping malls, schools, transit centers, hospitals, etc.)

c) Transit route dwell time exceeds 30 seconds.

d) Posted traffic speed limit is greater than 40 mph.

e) Bus volumes are 5 or more per peak hour.

f) Passenger volumes exceed 20 boardings per hour.

g) Traffic in the curb lane exceeds 250 vehicles during peak hours.

h) History of traffic and/or pedestrian accidents at the stop location.

i) Sight distance prevents traffic from stopping safely behind a stopped bus.

Bus turnouts shall be designed to meet the regional standard described in the Metropolitan Transit Development Board's Designing for Transit Manual, and meet all applicable American with Disabilities Act (ADA) accessibility requirements.

The location of bus turnouts is subject to the approval of the City Engineer. Far side placement at intersections is preferred in most cases to avoid conflicts with right turn movements and obstruction of views of traffic for pedestrians and autos.

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3-401.11 STREET STANDARD SUMMARY

CLASS	CVDS DWG. NO.	DESIGN ADT	DESIGN SPEED MPH (KPH)	STREET WIDTHS[8]							MINIMUM CENTERLINE RADIUS[1]		MAX. GRADE %
				TRAVEL LANES (ft.(m))		PARKING LANES (ft.(m))		MEDIAN WIDTH (ft.(m))	CURB-CURB (ft.(m))	ROW (ft.(m))	SUPER-ELEV. (ft.(m))	NO SUPER-ELEV. (ft.(m))	
				NO. LANES	WIDTH/ LANE	NO. LANES	WIDTH/ LANE						
EXPRESSWAY	CVD-ST01	70,000	60 (96)	6	12 (3.6)	2	8 (2.4)	16 (4.9)	104 (32)	128 (39)	1,500 (457)	2,500 (762)	6
6-LANE PRIME ARTERIAL	CVD-ST01	50,000	55 (88)	6	12 (3.6)	2	8 (2.4)	16 (4.9)	104 (32)	128 (39)	1,150 (350)	2,000 (610)	6
6-LANE MAJOR [2]	CVD-ST01 ST02	40,000	45 (72)	6	12 (3.6)	2	8 (2.4)	16 (4.9)	104 (32)	128 (39)		2,000 (610)	7
4-LANE MAJOR	CVD-ST02, ST21	28,000[3]	45 (72)	4	12 (3.6)	2	8 (2.4)	16 (4.9)	80 (24)	104 (32)		1,100[3] (335)	7
CLASS I COLLECTOR	CVD-ST02, ST21	22,000	45 (72)	4	12 (3.6)	2	8 (2.4)	4/10[4] (1.2/3)	74 (22.5)	94[4] (29)	700 (213)	1,100 (335)	8
CLASS II COLLECTOR	CVD-ST03, ST22	12,000	30 (48)	2	13 (4)	2	8 (2.4)	10 (3m)	52 (16)	72 (22)	300 (91)	450 (137)	10
CLASS III COLLECTOR	CVD-ST03, ST22	7,500/ 5,000[5]	30 (48)	2	20 (6)	-	-	-	40 (12)	60 (18)		450 (137)	12
RESIDENTIAL[6]	CVD-ST03 ST04, ST22, ST23	1,200	25 (40	2	18 (5.5)	-	-	-	36	56 (17)		200 (61)	15[7]
INDUSTRIAL	CVD-ST04, ST23	2,000	30 (48)	2	26 (8)	-	-	-	52	72 (22)		450 (137)	7

1 – SEE CURRENT STREET DESIGN STANDARDS POLICY FOR SUPERELEVATION CROSS SLOPES.
2 – THE CRITERIA FOR 6-LANE MAJORES IN DEVELOPED AREA WEST OF I-805 DIFFERS. SEE STREET DESIGN POLICY.
3 – THESE VALUES DIFFER FOR 4-LANE MAJORS IN A LOW DENSITY AREA. SEE STREET DESIGN POLICY.
4 – THESE VALUES MAY BE REDUCED WITH APPROVAL OF THE CITY ENGINEER. SEE STREET DESIGN POLICY.
5 – THIS VALUE IS FOR NO DRIVEWAY ACCESS FROM ABUTTING PROPERTIES. IF DRIVEWAY ACCESS IS APPROVED, USE 5,000 ADT
6 – THESE VALUES VARY FOR SINGLE LOADED RESIDENTIAL STREETS. SEE STREET DESIGN POLICY
7 – STREET SEGMENTS IN EXCESS OF 12% SHALL NOT EXCEED 300 FT. IN LENGTH. AVERAGE GRADE OVER ANY 1,000 FT. SEGMENT SHALL NOT EXCEED 10%.
8 – ADDITIONAL WIDTH SHALL BE PROVIDED FOR ROADWAYS WITH DESIGNATED BIKE LANES.

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3-402 General Design Criteria – *Otay Ranch Street Standards*

Streets must be designed as required for the various functional classifications. Whenever expected ADT is greater than the approximate maximum ADT stated, the street shall be designed to a higher satisfactory functional classification unless otherwise approved by the Director of Planning and Building and the City Engineer. These standards should be used within the **Otay Ranch GDP** area only.

3-402.1 **Otay Ranch Expressway**

Expressways are designed to move high volumes of traffic between major generators and to distribute traffic to and from the freeway system and provide intercommunity access. See Chula Vista Design Standard CVD-ST31 for typical cross section.

(1) Design Features

There are three primary design features which contribute to higher roadway capacity on the expressway facility. These capacity increasing features include one mile (2km) spacing of major crossing intersections, grade separated urban interchanges and restricted access.

(2) Intersections/Crossings

a) Major crossings shall be spaced no less than one mile (2km) intervals except upon approval of the City Engineer. These major crossings shall be controlled by grade separated urban interchanges. Also, at locations where the expressway facility crosses regional freeways, special interchange geometric configurations may be required to carry the high volumes anticipated on the expressway facility.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the expressway corridor. No median openings shall be permitted.

c) Pedestrian crossing demand should be well planned, focused and controlled to allow the periodic placement of mid-block overpasses to link major generators and attractors where appropriate.

(3) Access

Vehicular access to and from the expressway from minor streets or abutting properties shall typically be restricted. Limited street or driveway access will only be considered by the City Engineer if all other feasible means of obtaining alternate access have been exhausted.

(4) Landscaping - Expressways shall provide landscaped buffer areas.

(5) Parking/Bicycles - All non-motorized travel and parking on these facilities shall be prohibited with the exception of emergency parking.

(6)	Design ADT	-	70,000 Level of Service C
(7)	Minimum design speed	-	60 mph (96kph)
(8)	Curb-to-curb	-	104' (32m) (includes a 16'(5m) raised median)
(9)	Right-of-way	-	128' (39m)
(10)	Maximum grade	-	6%
(11)	Minimum curve radius	-	1,500' (457m) with 5% super-elevation; 2,500' (762m) with no superelevation

3-402.2 **Otay Ranch-Six-lane Prime Arterial**

The prime arterials are designed to move traffic between major generators. See CVD-ST31 for typical cross section.

(1) Intersections/Crossings

a) Typically, intersections shall be spaced no closer than 660 feet (200m) and signalized intersections shall be spaced no closer than one-half mile (804m) intervals.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the arterial corridor. No median openings shall be permitted except at major intersections.

c) Widen all approaches to intersections as per CVD-ST12 in order to provide for additional lanes as per CVD-ST37.

d) Pedestrian crossing demand should be well planned, focused and controlled to allow for crossings at major signalized intersections as well as the periodic placement of mid-block overpasses to link major generators and attractors where appropriate.

(2) Access

Vehicular access to and from prime arterials from minor streets or abutting properties shall typically be restricted. No direct access from single-family residential homes is allowed. Should a property have frontage only on the prime arterial facility, driveway or minor street access shall be permitted at locations deemed appropriate by the City Engineer. These access points shall be limited to right turns in and right turns out only. Also, these access points shall require additional roadway width to provide for acceleration and deceleration lanes.

(3) Landscaping - Landscaped buffer areas shall be provided on prime arterial facilities.

(4) Parking - Parking on this facility shall be prohibited with the exception of emergency parking.

(5) Bicycles - Bike lanes shall be provided on prime arterial facilities in conformance with routes identified in the Bicycle Element of the Chula Vista General Plan.

(6) Design ADT - 50,000 Level of Service C

(7) Minimum design speed - 55 mph (88kph)

(8) Curb-to-curb - 104' (32m)(includes a 16' (5m) median)

(9) Right-of-way - 128' (39m)

(10) Maximum grade - 6%

(11) Minimum curve radius - 1,150' (350m) with 5% super-elevation; 2,000' (610m) without superelevation

3-402.3 OTAY RANCH - SIX-LANE MAJOR

Major streets are primarily designed to distribute localized trips. See CVD-ST31 for typical cross-sections.

(1) Intersections/Crossings

a) Typically, intersections shall be spaced no closer than 660 feet (200m) and signalized intersections shall be spaced no closer than one-quarter mile (402m) intervals.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the major corridor. One mid-block median opening may be permitted with approval of the City Engineer. Such intersections and any resulting signals shall not negatively impact signal progression and traffic flow on major streets. This opening shall typically be spaced at the mid-point between the major intersections (approx. 660’ (200m)). The specific location of these median openings shall be determined by the City Engineer.

c) Widen all approaches to intersections as per CVD-ST13 and CVD-ST14 in order to provide for additional lanes, as per CVD-ST37.

d) Pedestrian crossing demand should be well planned, focused and controlled to direct pedestrians to designated crossing points at signalized intersections.

(2) Access

Vehicular access to and from six-lane major streets from abutting properties (commercial) shall typically be controlled but not restricted. No direct access

from single-family residential homes is allowed. Full access median openings will be permitted on these facilities only at locations specified by the City Engineer and under conditions established by the City.

(3) Landscaping – Six-lane major arterials shall provide landscaped buffer areas.

(4) Parking – Parking on these facilities shall be prohibited with the exception of Emergency Parking.

(5)	Design ADT	-	40,000
(6)	Minimum design speed	-	45 mph (72kph)
(7)	Curb-to-Curb (5m) raised median)	-	104’ (32m) (includes a 16’
(8)	Right-of-Way	-	128’ (39m)
(9)	Maximum Grade	-	7%
(10)	Minimum curve radius elevation	-	1,100’ (335m) with no super-

3-402.4 **OTAY RANCH - FOUR-LANE MAJOR**

Major streets are primarily designed to distribute localized trips. See CVD-ST31 for typical cross section.

(1) Intersections/Crossings

a) Typically, intersections shall be spaced no closer than 660 feet (200m) and signalized intersections shall be spaced no closer than one-quarter mile (402m) intervals.

b) A raised median is required to separate the two directions of travel and to improve the visual appearance of the arterial corridor. One mid-block median opening may be permitted only with approval of the City Engineer. Such intersection and any resulting signals shall not negatively impact signal progression and traffic flow on major streets. This opening shall typically be spaced at the mid-point between the major intersections (approx. 660' (200m)). The specific location of these median openings shall be determined by the City Engineer.

c) Widen all approaches to intersections as per CVD-ST31 in order to provide for additional lanes, as per CVD-ST37.

d) Pedestrian crossing demand should be well planned, focused and controlled to direct pedestrians to designated crossing points at signalized intersections.

(2) Access

Vehicular access to and from four-lane major streets from abutting properties shall typically be controlled but not restricted. No direct access from single-family residential homes is allowed. In developed areas direct access from single-family homes may be allowed as determined by City Engineer. Full access median openings may be permitted at locations as determined by the City Engineer and under conditions established by the City.

(3) Landscaping - Four-lane majors shall provide landscaped buffer areas.

(4) Parking - Parking on these facilities shall be prohibited with the exception of emergency parking.

		Commercial Areas (frequent driveways)	Low Density Areas
(5)	Design ADT	28,000	30,000
(6)	Minimum design speed	45 mph (72kph)	55 mph (88kph)
(7)	Curb-to-curb	80' (24m) [includes 16' (5m) median]	80' (24m) [includes 16' (5m) median]
(8)	Right-of-Way	104' (32m)	104' (32m)
(9)	Maximum Grade	7%	7%
(10)	Minimum curve radius	1,100' (335m) with no super-elevation	1,150' (350m) with 5% superelevation; 2,000' (610m) with no superelevation

3-402.5 **Otay Ranch-Transit Village Entry/Village Entry**

Village entry streets serve primarily to circulate localized traffic and to distribute traffic to and from arterials and major streets. These streets are designed to accommodate four lanes of traffic, however, they carry lower traffic volumes at slower speeds than major arterials. See CVD-ST32 for typical cross section.

(1) Intersections/Crossings

a) Typically, signalized and unsignalized intersections shall be spaced no closer than 400 feet (120m).

b) Widen all approaches to intersections as per CVD-ST36 in order to provide for additional lanes, as per CVD-ST37.

(2) Access

Access to and from these facilities from abutting properties shall typically be controlled but not restricted. No direct access from single-family residential homes is allowed. Only limited access from commercial or multi-family properties served by a single driveway may be allowed with the approval of the City Engineer.

(3) Parking - Parking on this facility shall be prohibited with the exception of emergency parking. However, parking at Village core areas may be approved as determined by the City Engineer.

		Transit Village Entry	Village Entry
(4)	Design ADT	22,000	22,000
(5)	Minimum design speed	35 mph (56kph)	35 mph (56kph)
(6)	Curb-to-curb	97-111' (29.6-33.8m) 133'-137' (40.5-41.8m)	76' (23.2m) 112' (34m)
(7)	Right-of-Way	104' (32m)	104' (32m)
(8)	Maximum Grade	8%	8%
(9)	Minimum curve radius	450' (137m) with no super-elevation	450' (137m) with no superelevation

3-402.6 **Otay Ranch-Secondary Village Entry w/Median/Secondary Village Entry**

Secondary Village Entry streets serve primarily to circulate localized traffic and to distribute traffic to and from arterials, major streets and Village entry streets. These facilities are designed to carry lower traffic volumes at slower speeds than Village entry streets. This type of facility provides access to properties and circulation to residential neighborhoods. See CVD-ST33 for typical cross section.

(1) Intersections

a) Minimum distance between centerline of intersections shall be 250 feet (76m).

b) Widen all approaches to intersections as per CVD-ST36 in order to provide for additional lanes, as per CVD-ST37.

(2) Access - Access to and from this facility from abutting properties shall be permitted at locations approved by the City Engineer.

(3) Parking – Parking on this facility shall be prohibited with the exception of Emergency Parking.

		Secondary Village Entry w/Median	Secondary Village Entry
(4)	Design ADT	7,500	7,500
(5)	Minimum design speed	25 mph (40kph)	25 mph (40kph)
(6)	Curb-to-curb	68' (207m)	34' (104m)
(7)	Right-of-Way	95' (29m)	61' (22.9m)
(8)	Maximum Grade	10% (residential)	10% (residential zone)
(9)	Minimum curve radius	200' (61m) with no super-elevation	200' (61m) with no superelevation

3-402.7 **Otay Ranch-Residential Promenade/Core Promenade**

Promenade streets circulate localized traffic as well as distribute traffic to and from arterials and other collectors to access residential areas. These streets accommodate low volume levels and the use of this facility as a carrier of through traffic should be discouraged by its design. See CVD-ST34 for typical cross section.

(1) Intersections – Minimum distance between centerline of intersections shall be 250 feet (76m)

(2) Parking – Parking on this facility shall typically be allowed. However, parking at critical locations may be denied as deemed appropriate by the City Engineer.

		Core Promenade	Residential Promenade
(3)	Design ADT	7,500 with no driveway access from abutting property. 5,000 with driveway access from abutting property.	7,500 with no driveway access from abutting property. 5,000 with driveway access from abutting property.
(4)	Minimum design speed	25 mph (40kph)	25 mph (40kph)
(5)	Curb-to-curb	40' (12m)	32' (9.8m)

(6)	Right-of-Way	69’ (20.4m)	59’ (18.0m)
(7)	Maximum Grade	12%	12%
(8)	Minimum curve radius	200’ (61m) with no super-elevation.	200’ (61m) with no superelevation

3-402.8 **Otay Ranch-Parkway Residential/Single Loaded Residential**

(1) See CVD-ST35 for typical cross section.

(2) Minimum distance between centerline intersections shall be 150 feet (46m).

(3) Grade segments in excess of 12% shall not exceed 300 feet (91m) in length.

(4) Minimum radius for cul-de-sacs with a maximum length of 500 feet (152m) may be 100 feet (30m) and a maximum central angle of 45ø subject to the approval of the City Engineer. The minimum tangent length between horizontal curves of radius 100 feet (30m) shall be 150 feet (152m).

(5) Average grade over any 1,000-foot (305m) segment shall not exceed 10%.

(6) Portland cement concrete pavement shall be required for grades in excess of 12%.

(7)	Design ADT	-	1,200
(8)	Minimum design speed	-	25 mph (40kph)
(9)	Curb-to-curb	-	32' (9.8m) (28' (8.5m) single loaded)
(10)	Right-of-way	-	58' (17.7m) (54' (16.5m) single loaded)
(11)	Maximum grade	-	15%
(12)	Minimum curve radius	-	200' (61m) with no superelevation

3-402.9 **Otay Ranch-Industrial Roads**

(1) See CVD-ST35 for typical cross section.

(2) Minimum distance between centerline intersections is 300 feet (91m).

(3)	Design ADT	-	2,000
(4)	Minimum design speed	-	30 mph (48kph)
(5)	Curb-to-curb	-	52' (16m)

(6)	Right-of-way	-	72' (22m)
(7)	Maximum grade	-	7%
(8)	Minimum curve radius	-	450' (138m) with no superelevation

3-402.10 **Otay Ranch-Additional Design Criteria**

(1) Refer to Section 3-401.10 for additional design criteria.

3-403 Public Streets/Otay Ranch Streets

3-403.1 The Chula Vista Street Design Standards Policy contains standards for typical street sections and specific design criteria. Generally, street systems shall provide:

(1) Streets compatible with the pattern and type of streets in the General Plan;

(2) Adequate capacity for the development of adjacent lands and projected traffic volumes;

(3) Adequate access for the area being developed;

(4) Type G monolithic curb, gutter and sidewalk per adopted San Diego Regional Standard Drawings unless otherwise approved by the City Engineer or shown on the approved Tentative Map.

3-403.2 **Subdivision Design Criteria for Streets**

(1) Generally street systems within subdivisions shall be designed as Class III collectors or residential streets and shall satisfy the City Standards for those classifications and the following general criteria:

a) Class III collector streets:

1) Collect and carry principally vehicular traffic generated by 120 to 500 tributary dwelling units through a subdivision.

2) Constitute the principal entrance to a residential subdivision of more than 120 lots.

b) Residential streets:

1) Provide access to not more than 120 tributary dwelling units

2) Are not to be used as a principal entrance to a subdivision and shall be designed in such manner as to discourage their use by through traffic.

3) Four-way intersections involving residential streets shall be avoided.

(2) Otay Ranch Streets: See Otay Ranch Street Standards Summary in Section 3-403.3 for the Otay Ranch Street Sections.

(3) Frontage roads are discouraged by the City but may be used upon approval of the City Engineer and City Council.

(4) Main access to any school shall meet or exceed requirements for a Class III Collector street.

(5) Half-width streets may be permitted by the City Council along the boundary of a subdivision or the developer's property. Only the portion of right of way required for the half-width street need be dedicated on the subdivision map. Minimum paved width from face of curb to edge of pavement shall be twenty-eight feet (8.5m).

(6) Streets proposed to provide future connections to adjoining property shall be extended to the subdivision boundary. Subdivider shall submit an alignment and profile demonstrating the feasibility of such a future extension. The profile shall extend a minimum of 300 feet (90m) beyond the subdivision boundary or as deemed necessary by the City Engineer.

(7) a) Cul-de-sac streets shall conform to CVD-ST06. A street ending in a cul-de-sac shall provide access to no more than 30 single-family residential lots.

b) Single family residential development shall not exceed 120 residential lots unless two points of access are provided.

c) Single family residential development shall not exceed 200 residential lots unless three points of access are provided.

d) Points of access mean streets with no driveway access consisting of two or more lanes. "Emergency access only" type connections shall not be considered as a point of access.

e) These requirements do not apply to condominium or multi-family residential land uses.

(8) All streets not intended for through traffic shall end in a cul-de-sac.

(9) Streets to be subsequently extended beyond the development boundaries shall terminate in one of the following:

a) A temporary turnaround with a minimum radius of 24 feet (7m) shall be constructed upon the adjoining property (If the adjoining property owner(s) grants permission to construct such temporary turnaround on their property; or

b) A temporary street shall be constructed across the adjoining property; or

c) A permanent type cul-de-sac will be constructed within the development boundaries as a temporary measure until the street is extended.

(10) Continuous Left-Turn Lanes. Ten-foot minimum, continuous, two-way left-turn lanes, may be authorized by the City Engineer subject to the following conditions:

a) Distance between curbs must exceed 36 feet; and

b) Posted speed limit does not exceed 40 miles per hour; and

c) Where development is primarily commercial, and where heavy demand exists for left-turns in and out of driveways.

(11) Minimum centerline grade for public streets shall be 0.5%.

(12) Portland Cement Concrete (PCC) pavement with cutoff walls shall be required for all public streets with centerline grades in excess of 12%.

(13) All horizontal curves shall have a minimum intervening tangent distance measured along the centerline in feet equal to four times the design speed (designated in miles per hour) of the street.

(14) Superelevation shall be provided on all streets where required by the City Engineer.

(15) Minimum curb return radii at face of curb shall be:

a) Residential street to residential street: 20 feet (6m)

b) All other intersections: 30 feet (10m)

(16) Sight Distance - Intersection sight distance shall comply with the current CALTRANS Highway Design Manual. Refer also to Chula Vista Design Standards.

If headlight sight distance is not available in grade sags, lighting may be considered and the following formula may be used:

$$L = \frac{AV^2}{46.5}$$

Where: L = Length of vertical curve
A = Algebraic difference of grades in percent
V = Design speed

This formula may be used only with written approval by the City Engineer.

(17) Placement of guardrail shall conform to the California Department of Transportation's Traffic Manual and AASHTO's Roadside Design Guide.

SECTION 3-403.3

OTAY RANCH STREET STANDARDS SUMMARY

CLASS	CVDS DWG. NO.[1]	DESIGN ADT	DESIGN SPEED MPH (KPH)	STREET WIDTHS [8]							MINIMUM CENTERLINE RADIUS[2]		MAX. GRADE %
				TRAVEL LANES (ft.(m))		PARKING LANES (ft.(m)) OR BIKE LANE		MEDIAN WIDTH (ft.(m))	CURB-CURB (ft.(m))	ROW (ft.(m))	SUPER ELEVATION (ft.(m))	NO SUPER ELEVATION (ft.(m))	
				No. Lanes	Width/ Lane	No. Lanes	Width/ Lane						
Expressway	CVD-ST31	70,000	60 (96)	6	12 (3.6)	2	8 (2,4)[3]	16 (4,9)	104 (32)	128 (39)	1,500 (457)	2,500 (762)	6
6-Lane Prime Arterial	CVD-ST31	50,000	55 (88)	6	12 (3,6)	2	8 (2,4)[3]	16 (4,9)	104 (32)	128 (39)	1,150 (350)	2,000 (610)	6
6-Lane Major	CVD-ST31	40,000	45 (72)	6	12 (3,6)	2	8 (2,4)[3]	16 (4,9)	104 (32)	128 (39)		1,100 (335)	7
4-Lane Major	CVD-ST31	28,000[4]	45 (72)	4	12 (3,6)	2	8 (2,4)[3]	16 (4,9)	80 (24)	104 (32)		1,100 (335)	7
Transit Village Entry	CVD-ST32	22,000	35 (56)	4	11(3.4) & 12(3.6)	2	7(2.1)[5]	36-50 (11-15.2)	97-111 (29.6-33.8)	133-147 (40.5-44.8)		450 (137)	8
Village Entry	CVD-ST32	22,000	35 (56)	4	11(3.4) & 12 (3.6)	2	7 (2.1)[5]	16 (4.9)	76 (23.3)	112 (34.1)		450 (137)	8
Secondary Village Entry w/Median	CVD-ST33	7,500	25 (40)	4	12 (3.6)			10 (3.0)	68 (20.7)	95 (29.0)		450 (137)	10
Secondary Village Entry	CVD-ST33	7,500	25 (40)	2	12 (3.6)				34 (10.4)	61 (22.7)		200 (61)	10
Core Promenade/Village Pathway	CVD-ST34	7,500[6]	25 (40)	2	12 (3.6)	2	8 (2.4)		40 (12.2)	67 (20.4)		200 (61)	12
Residential Promenade	CVD-ST34	7,500[6]	25 (40)	2	12 (3.6)	1	8 (2.4)		32 (9.8)	59 (18.0)		200 (61)	12
Parkway Residential	CVD-ST35	1,200	25 (40)	2	16 (4.9)				32 (9.8)	58 (17.7)		200 (61)	15[7]
Single Loaded Residential	CVD-ST35	1,200	25 (40)	2	16 (4.9) 12 (3.6)				28 (8.5)	54 (16.5)		200 (61)	15[7]
Industrial	CVD-ST35	2,000	30 (48)	2	26 (8)				52 (15.9)	78 (23.8)	300 (91)	450 (137)	7

1 - See the Chula Vista Design Standard Street Section Drawing for Additional Details and Notes
2 - See Current Street Design Standards policy for Superelevation cross slopes
3 - Only Emergency Parking is permitted
4 - These values differ fro 4-lane majors in a low density area. See Subdivision Manual Section
5 - Only Emergency Parking is permitted except in core areas where parking is permitted with the approval of the City Engineer
6 - This value is for no driveway access from single family residences. Driveway access to single family residences is permitted only if traffic volume does not exceed 5,000 vehicles per day. See Subdivision Manual Section
7 - Street Segments in excess of 12% shall not exceed 300 ft. in length. Average grade over any 1,000 ft. segment shall not exceed 10%.
8 – Additional width shall be provided for roadways with designated bike lanes.

3-404 Private Streets Within Subdivisions

3-404.1 Applicability

Private streets are not generally recommended but may be approved if they meet all of the following:

(1) Private streets will be allowed in new developments where their use is logically consistent with a desire for neighborhood identification and control of access, and where special overall design concepts may be involved. The use of private streets shall be limited to cul-de-sacs and to minor local streets not carrying through traffic and those with a projected traffic volume not exceeding 800 ADT. Private street designations shall be subject to review and approval by the Planning Commission and the City Council.

(2) The streets are not required to serve properties outside the development and is not required for general public circulation.

(3) Maintenance of said streets shall be provided by homeowners association and the City is made a party to the covenants, conditions and restrictions and shall have the right to enforce said agreement.

3-404.2 Design Criteria

(1) **Minimum Widths**

a) With parking on both sides: 36' (11m) curb to curb

b) With parking on one side only: 32' (10m) curb to curb

c) Without parking: 24' (8m) curb to curb

(2) **Grades**

a) Maximum 15% (Over 12% PCC pavement with cutoff walls required)

b) Minimum 1.0% unless a flatter grade, to 0.5% is approved by the City Engineer.

(3) **Horizontal Alignment**

a) Minimum design speed shall be 15 mph (24kph).

b) Streets shall normally intersect at right angles and shall have at least 20' (6m) of tangent adjacent to intersections. The tangent length shall be increased where short radii curves are used near the intersections.

c) Cul-de-sacs shall not ordinarily exceed 500' (150m) in length. Curb radius at the turnaround shall be at least 30' (9m) if parking is prohibited and 40' (12m) if parking is not prohibited.

d) Centerline radius shall be 150' (45m) minimum for loop streets over 800' (244m) in length, and 100' (30m) minimum for cul-de-sacs and for loop streets less than 800' (244m) in length. Where right-angled bends are used in the street pattern, in lieu of the minimum radii required above, widening sufficient to accommodate truck turning movements shall be provided by use of knuckles or other appropriate means. Curb return radius shall be 15' (5m) minimum.

(4) **Vertical Design**

a) Sight distance equal to 25 mph (24kph) minimum.

b) Vertical curves used when change in grade exceeds 1% in sags and 0.5% on crests.

3-404.3 **Other Requirements**

(1) Lighting adequate for pedestrian and vehicle safety and adequate for security purposes shall be provided subject to the approval of the City Engineer.

(2) Easements for utility and drainage purposes shall be provided as required by the City Engineer.

(3) Easements for street trees shall be provided unless waived on the Tentative Map or by the City Engineer.

(4) Where it is proposed to reduce street widths by the reduction or elimination of curbside parking, equivalent parking shall be provided by other means subject to approval by the Planning Commission.

(5) Adequate provision subject to Planning Commission approval shall be made for trash pickup and for emergency vehicle access.

(6) Adequate signs, subject to the approval of the City Engineer and Planning Director shall be provided and maintained at all entrances to private streets clearly designating the private status of such streets.

(7) The City will assume no responsibility for enforcement of traffic control unless specifically requested and approved by City Council.

(8) A paving plan shall be submitted to the Department of Planning and Building in compliance with their handout entitled "Guidelines for the Installation and Acceptance of Paving on Private Property in the City of Chula Vista". Along with the paving plan calculations supporting the proposed structural street sections shall be submitted. Structural street sections shall meet the minimum requirements of Section 3-405. (Applies to driveway, parking areas and other similar situations.)

(9) Where streets are proposed to be offered for dedication and rejected, the street design shall conform to public street standards.

(10) The design of all private streets shall be reviewed and subject to the approval by the City Engineer; and the construction shall be inspected by the Engineering Division of the Public Works Department. Private street construction is subject to standard design review and inspection deposits.

(11) All private streets with controlled access devices, such as gates, shall contain the following features:

a) Gates shall be a minimum 150 feet (45m) away from the extension of the intersection street curbline, except upon approval by the City Engineer.

b) All motorized gates shall include a knox switch and opticom device with manual override approved by the City Fire Marshal.

c) A turnaround shall be provided at the location of the gate. The size and location of the said turnaround and gate shall be approved by the City Engineer.

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3-405 Street Names

3-405.1 General

Candidate street names for all streets, public and private, within subdivisions shall be submitted to the City for review and approval. Generally, street names and suffixes shall conform to CVD TR06A and the following:

(1) Length - Street names including suffixes shall be no longer than 15 characters with every two "I" characters counting as one character.

(2) Names for streets shall:

a) be unique in spelling and pronunciation to prevent confusion with existing streets;

b) not be named after a person unless that person is deceased and has made a significant achievement or contribution;

c) be short names for short streets, cul-de-sac streets and winding streets.

d) loop streets shall be named such as to avoid intersections with the same name.

e) avoid directional prefixes when possible.

3-405.2 **Suffixes** - Street name suffixes are determined by the street classification and direction and shall conform to the following:

(1) Prime Arterials; Major Streets; Collectors; Residential Streets; Commercial/Industrial Roads that are:

a) Generally straight:

1) N-S Direction - AVENUE (AVENIDA)
2) E-W Direction - STREET (CALLE)

b) Meandering:

1) N-S Direction - DRIVE (PASEO)
2) E-W Direction - ROAD (CAMINO)

c) Cul-de-Sacs:

1) N-S Direction - PLACE (PLAZA)
2) E-W Direction - COURT (CORTE)

d) Loop Streets - CIRCLE or LOOP (CIRCULO)

(2) Hillside Streets that are generally:

a) Between fields and enclosed with fences and trees - LANE

b) Routes to or between specific location(s) - WAY (VIA)

c) Along tops of slopes - TERRACE (TERRAZA)

d) On steep slopes - GRADE (GRADO)

e) View Streets - VIEW (VISTA)

(3) Frontage Roads and Alleys are not named.

(4) Street names shall not include directions with the suffix, i.e., Calle Cristobal South.

(5) Names for Private Streets shall follow the naming standards for public streets.

3-405.3 STREET NAME SUMMARY

TYPE OF STREET	APPROVED SUFFIX (SPANISH EQUIVALENT)	REMARKS
1 – PRIME ARTERIALS; MAJOR, COLLECTOR, & RESIDENTIAL STREETS; & INDUSTRIAL ROADS	N-S DIRECTION: AVENUE (AVENIDA) N-S DIRECTION:….DRIVE (PASEO) E-W DIRECTION: STREET (CALLE) E-W DIRECTION: ROAD (CAMINO)	GENERALLY STRAIGHT GENERALLY MEANDERS GENERALLY STRAIGHT GENERALLY MEANDERS
2 – CLASS III COLLECTOR & RESIDENTIAL CUL-DE-SACS	N-S DIRECTION: PLACE (PLAZA) E-W DIRECTION: COURT (CORTE)	
3 – CLASS III COLLECTOR & RESIDENTIAL LOOP STREETS	CIRCLE (CIRCULO) LOOP	
4 – HILLSIDE STREETS	LANE WAY (VIA) TERRACE (TERRAZA) GRADE (GRADO) VIEW (VISTA)	GENERALLY BETWEEN FIELDS AND ENCLOSED WITH FENCES AND TREES ROUTE TO OR BETWEEN SPECIFIC LOCATION(S) COMMONLY FOLLOWS TOP OF SLOPE STEEP SLOPE VIEW STREET
5 – FRONTAGE ROADS & ALLEYS	NOT NAMED	
6 – PRIVATE STREETS		

NOTES:
1. THE MAXIMUM NUMBER OF LETTERS PER NAME INCLUDING SUFFIX – 15; TWO “I” COUNT AS ONE LETTER
2. USE SHORT NAMES FOR SHORT STREETS, CUL-DE-SACS AND WINDING STREETS TO ALLOW NAMES TO BE SHOWN ON MAPS & PLANS.

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3-406 Structural Section Design

3-406.1 **General**

(1) Dedicated streets and Otay Ranch streets with grades up to 12% shall be paved with asphalt concrete; streets with grades over 12% and alleys will be paved with Portland Cement Concrete in accordance with City of Chula Vista Standard Specifications.

(2) Suitably designed Portland Cement Concrete pavement may, upon approval by the City Engineer, be substituted for any of the asphalt pavements.

3-406.2 Asphalt Pavement

(1) Structural Sections.

a) Asphalt Concrete:

1) Minimum of 5" minimum section per table 3-405.3 thickness on prime arterials and major (6 Lane) streets..

2) Minimum 4" thickness on major (4 lanes) streets, collectors, and residential collectors.

3) Minimum 3" thickness on residential streets.

b) Aggregate base: Minimum type and thickness as shown on table 3-405.3.

(2) 1" of asphalt concrete may be substituted for 2" of aggregate base on streets with Traffic Indices of 7.0 or lower, however the minimum standards for asphalt concrete and base above are required in all cases.

(3) The City Engineer shall design all structural sections for asphalt pavement in accordance with CalTrans Highway Design Manual, latest revision ("R" Value shall be based upon "R" Value by stabilimeter or by expansion whichever is the least.)

(4) Soil tests shall be performed by a civil engineer registered in the State of California, principally doing business in the field of applied soil mechanics. Location and number of samples and soil tests to be performed shall be as designated by the City Engineer.

(5) Pavements structural sections must be designed to carry the projected one-way truck traffic for a period of 20 years in accordance with the CalTrans Highway Design Manual. The traffic index (T.I.) shall be as established by the City Engineer.

3-406.3 **Concrete Construction**

(1) Design of Portland Cement Concrete Pavement for streets shall be in accordance with the Portland Cement Association's "Structural Design of Rigid Pavements".

(2) Curbs, gutters, sidewalks and driveways shall be constructed of Portland Cement Concrete. Temporary facilities may be constructed of asphalt or other material if shown on the approved Tentative Map or authorized by the City Engineer.

(3) Sidewalk ramps shall be included with the construction of curb returns at such locations as specified by the City Engineer.

(4) The City Engineer may require cross block pedestrian ways for access to schools, playgrounds, shopping centers and similar facilities. Such ways shall be at least 8 feet in width, fully paved with a minimum thickness of 4" Portland Cement Concrete and bordered by landscaping with chainlink fence or masonry walls.

3-406.4 **Alleys, Driveway Approaches and Driveways**

(1) Residential driveway approaches shall conform to Chula Vista Standard Drawing CVCS1.

(2) Alley-type driveway approaches shall conform to Regional Standard Drawing G17 (modified). An alley-type approach may be authorized or required by the City Engineer for any situation involving large traffic volumes and/or safety considerations.

(3) Driveways serving two or more dwelling units shall be constructed to commercial driveway standards per CVCS1.

(4) Alleys shall conform to Regional Standard Drawing G-21.

(5) The minimum thickness of concrete alley driveway approaches and alleys is 5 1/2-inches (14cm) subject to soils tests of the subgrade verifying that the R-values are adequate for that thickness. If tests are not provided, those improvements shall be constructed 8-inches (20cm) thick and shall be reinforced with 6"x6" (15cm x 15cm), 4/4 welded wire mesh. The plans shall have a note reflecting this requirement.

MINIMUM STRUCTURAL SECTIONS FOR VARIOUS ROAD CLASSIFICATIONS(1)

ROAD CLASSIFICATION	TRAFFIC INDEX MINIMUM	MINIMUM AC THICKNESS	MINIMUM CRUSHED AGGREGATE BASE THICKNESS
PRIME ARTERIAL	9.5	5”	12” (2)
6 LANE MAJOR	9.5	5”	11” (2)
4 LANE MAJOR	9.0	4”	12” (2)
INDUSTRIAL	9	5"	11"(2)
CLASS I COLLECTOR (VILLAGE ENTRY)	8.5	4”	11” (2)
CLASS II COLLECTOR (SECONDARY VILLAGE ENTRY)	8.0	4”	10” (2)
CLASS III COLLECTOR	7.5	4”	8” (3)
RESIDENTIAL	6.0	3”	7” (3)
RESIDENTIAL CUL-DE-SAC	5.0	3”	4” (3)

NOTE:

1) The native subgrade material shall have an R-value equal to or greater than 40 in order for the minimum structural section to be allowed

2) Crushed aggregate base (Green Book Section 200-2.2) shall be used for Prime Arterials, Major Roadways, Class I and Class II Collectors. Alternatively, crushed aggregate base with a minimum sand equivalent of 40, minimum fine durability of 60, and manufactured from a “Hard Rock Quarry” may be used for Prime Arterials, Major Roadways, Class I and II collectors, provided all other quality requirements specified in Section 200-2.2 of the “Green Book" for Crushed Aggregate Base are satisfied. “Hard Rock Quarry” is defined as an igneous or metamorphic rock source characterized by a strong-bonded structure and is excavated by blasting.

3) Crushed aggregate base with a minimum sand equivalent of 40 shall be used for Class III Collectors and residential streets, provided all other quality requirements specified for crushed aggregate base in Section 20-2.2 of the “Standard Specifications for Public Works Construction (Green Book)” are satisfied.

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3-407 Street Lights, Pavement Markings and Street Signs

3-407.1 **Street Lights** – At the first improvement plan submittal stage, the Developer is required to submit improvement plans showing street light locations and type. At the second submittal, the Developer is required to submit the following: pull box location and type, conduit and wire location and size, service point locations and voltage drop calculations. Developer will be responsible for furnishing and installing the complete street lighting system including underground circuitry, standard, and luminaire.

(1) Street Light Standards

a) 100 watt, 150 watt and 250 watt, high pressure sodium vapor, street lighting standard per CVCS 6.

b) Street lighting standards, foundation and details CVCS 7, 8, and 9.

(2) Number and location of street lights shall be subject to the approval of the City Engineer.

3-407.2 **Pavement Markings and Street Signs**

(1) The Developer's engineer is required to submit a separate signing and striping plan for any street classified as a Class III Collector or higher, or functioning as a Collector. Signing and striping shall conform to the California Department of Transportation's Traffic Manual.

The Developer's engineer shall submit the signing and striping plan with the first improvement plan submittal.

(2) Developer will pay for street name signs and regulatory signs and their installation.

(3) The City shall install all regulatory and street name signs.

(4) Street name signs shall be placed at the right-hand corner of the secondary street entering or intersecting with a primary street.

LOCATIONS

Sufficient lighting shall be provided at the following: intersections, short radius curves, knuckles, at the neck of cul-de-sacs, and at other potential traffic safety locations as may be determined by the City Engineer. Other than at the locations listed, street lights will be installed at typical spacing as specified in the table contained herein, on tangent portions of roadway.

STANDARDS

The following standards shall apply to lighting on public streets in compliance with this policy.

Street Classification	Street Width Curb to Curb	Size/Type Light Fixture	Spacing of Light Standards	Short Radius Curve Defined
Residential Street	36' or less	100 watt HPSV	350' to 450'	250' or less
Class III Collector	> 36' to 40'	150 watt HPSV	300' to 400'	450' or less
Arterial Streets	Greater than 40'	250 watt HPSV	See Notes Below	1,100' or less

Notes:

1. Installations are to be of a staggered pattern (alternating sides of the street). A street light will be provided at a typical spacing of 175' to 250' on the stagger or every 350' to 500' along the same side of the street.

2. Upon divided roadways with center median islands of at least 14' in width, the street light standards will be provided, centered on the median island, at a typical spacing between 125' and 250' between light standards. Each median mounted standard will have two mast arms and luminaries so that there is lighting over each half of the roadway.

3. On existing streets, the same standards shall apply, except that the spacing on residential streets shall not exceed 600'. Street lights on all streets less than 40' in width will be 100 Watt, High Pressure Sodium Vapor (HPSV) full cut-off fixtures.

4. All street lighting shall be installed in accordance with Chula Vista Standards Drawings per sheets CVCS-6,7,9,10 & 11 and CVD-TR04.

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